19 DECEMBER 1952

ONE SHILLING

FLIGHT

and

AIRCRAFT ENGINEER

Christmas Greetings

from WESTLAND

AIRCRAFT LIMITED YEOVIL

As the new Armstrong Whitworth N.F.11 comes into service, the night fighter defences of Western Europe get a savage, dependable set of fighting teeth. The R.A.F. hails this deadly acquisition, faster than any known night fighter, for interception or long range pursuit. Ventral and wing-tip tanks give the N.F.11 that precious second wind. Elaborate radar equipment—the N.F.11 is a flying radar station—ensures that contact is made and kept with the elusive quarry until the time comes to open up with the four 20 mm. cannon mounted in the wings.

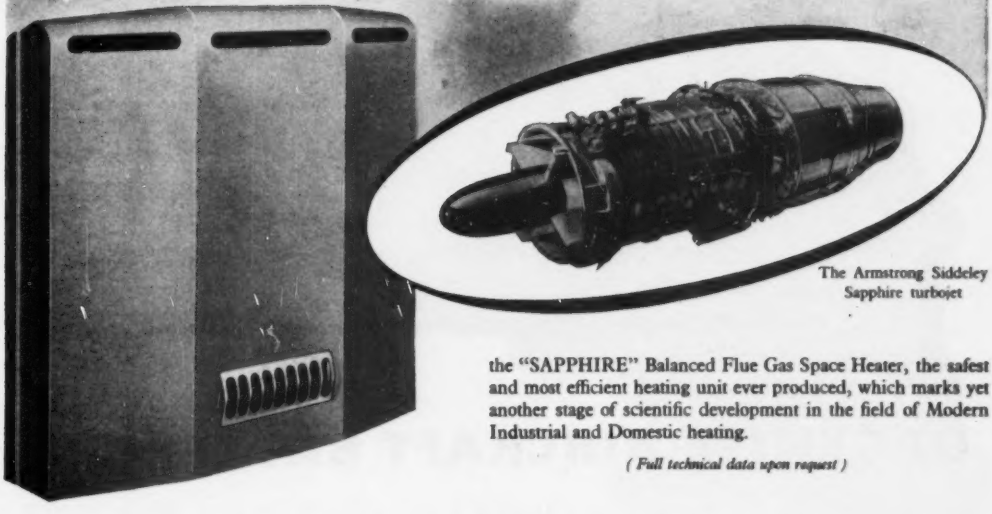
ARMSTRONG WHITWORTH N.F.11

SIR W. G. ARMSTRONG WHITWORTH AIRCRAFT LIMITED.
BAGINTON, COVENTRY, ENGLAND

MEMBER OF THE HAWKER SIDDELEY GROUP

Products of British Genius . . .

The Sapphire Turbojet, the world's most powerful type tested aero engine provides enormous power and has enabled a British aircraft to make new records and add further international laurels to the skill and craftsmanship of the British Aircraft Industry. We gladly record our tribute and introduce another "SAPPHIRE" namely.....



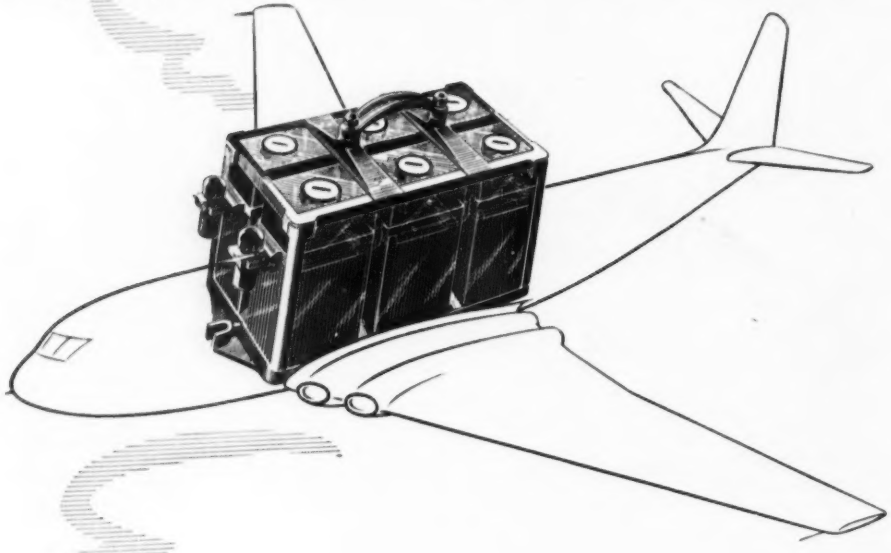
The Armstrong Siddeley Sapphire turbojet

the "SAPPHIRE" Balanced Flue Gas Space Heater, the safest and most efficient heating unit ever produced, which marks yet another stage of scientific development in the field of Modern Industrial and Domestic heating.

(Full technical data upon request)

COWPER PENFOLD AND COMPANY LIMITED
IMPERIAL COURT · KNIGHTSBRIDGE · LONDON S·W·3
Telephone : KENSINGTON 3677-8-9

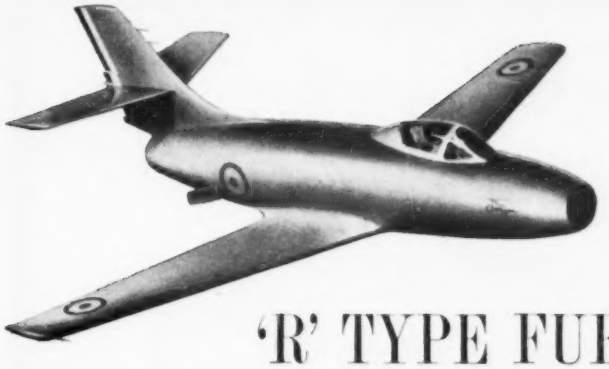
Flying high with the DE HAVILLAND COMET



The World's first jet-propelled airliner in regular service is equipped with . . .

DAGENITE AIRCRAFT BATTERIES

PETO AND RADFORD · 137 VICTORIA STREET · LONDON · SWI



'R' TYPE FUEL COCKS in the OURAGAN

SIZES AVAILABLE:
1", 1¼", 1½", 1¾", 2" B.S.P.

WEIGHT EXAMPLES:
2" B.S.P. Cock, fitted Western Actuator, as illustrated, 3.68 lb.
2" B.S.P. Cock, single spring loaded handle, 1.86 lb.

METRIC THREADS SUPPLIED

The Marcel Dassault 450 Ouragan, a straight-wing jet fighter now being delivered to the French Air Force, uses Vickers-Armstrongs 'R' type fuel cocks. These compact and reliable components save not only weight but space as well, because the actuator is in line with the fuel pipe. Maintenance is simple, as the actuator can be detached and the cock left in the fuel line.

VICKERS-ARMSTRONGS LIMITED

AIRCRAFT DIVISION : WEYBRIDGE : SURREY

To all our friends
Best Wishes for
Christmas
and a Happy and
Prosperous New Year

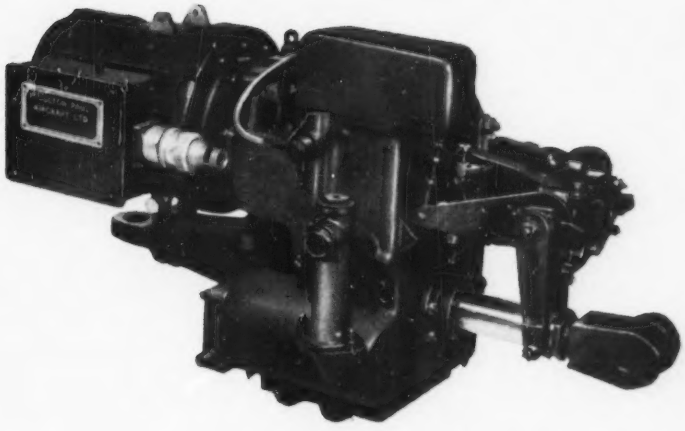
SPE

SELF PRIMING PUMP & ENGINEERING COMPANY LIMITED. SLOUGH. BUCKS. TELEPHONE: SLOUGH 23277

BOULTON PAUL

HIGH FIDELITY

POWER CONTROLS



TYPICAL UNIT FOR A LARGE BOMBER AIRCRAFT

UNEQUALLED FOR

✡ SENSITIVITY ✡ FIDELITY ✡ STABILITY ✡

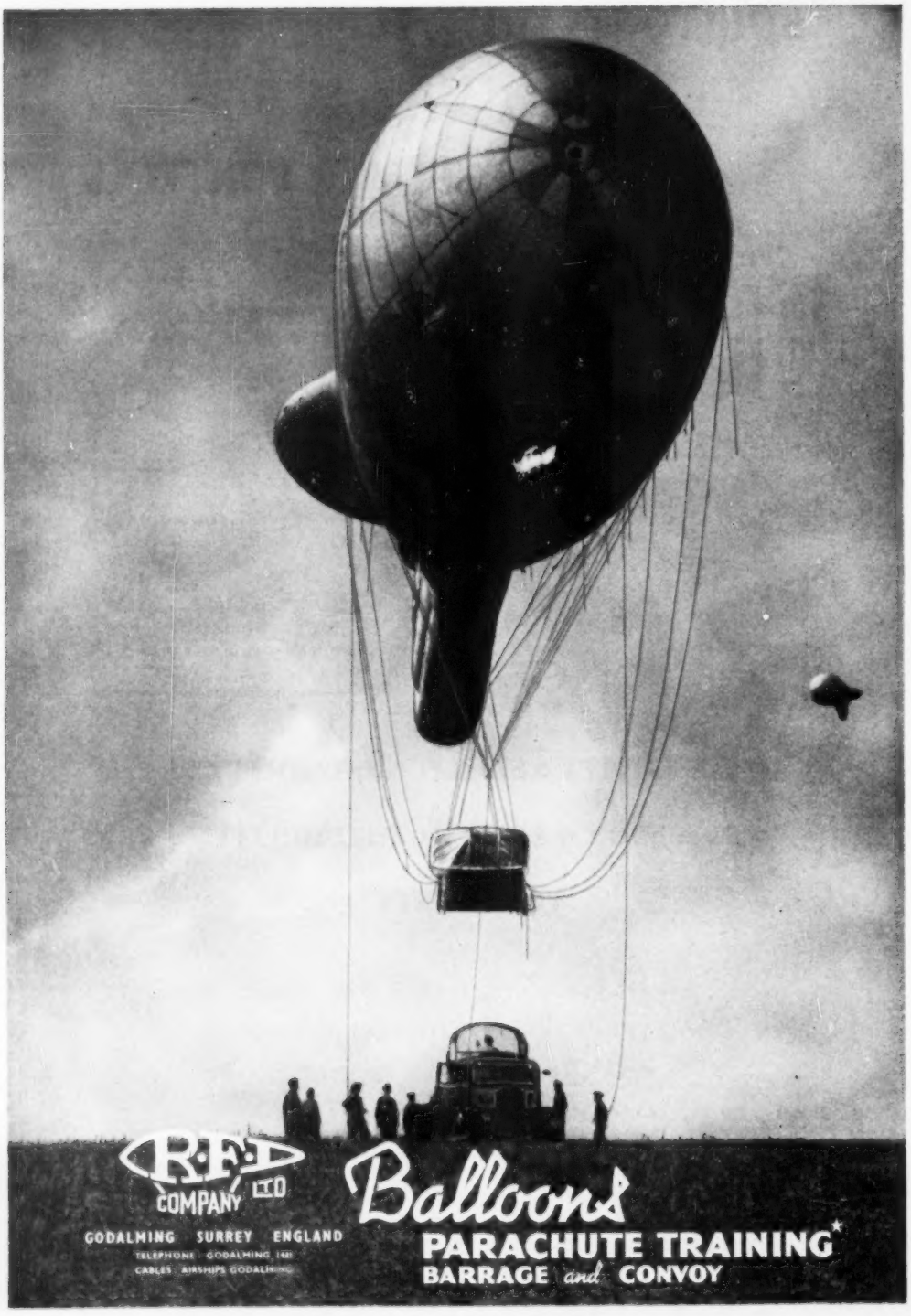
✡ PRECISION ✡ SAFETY ✡ RELIABILITY ✡

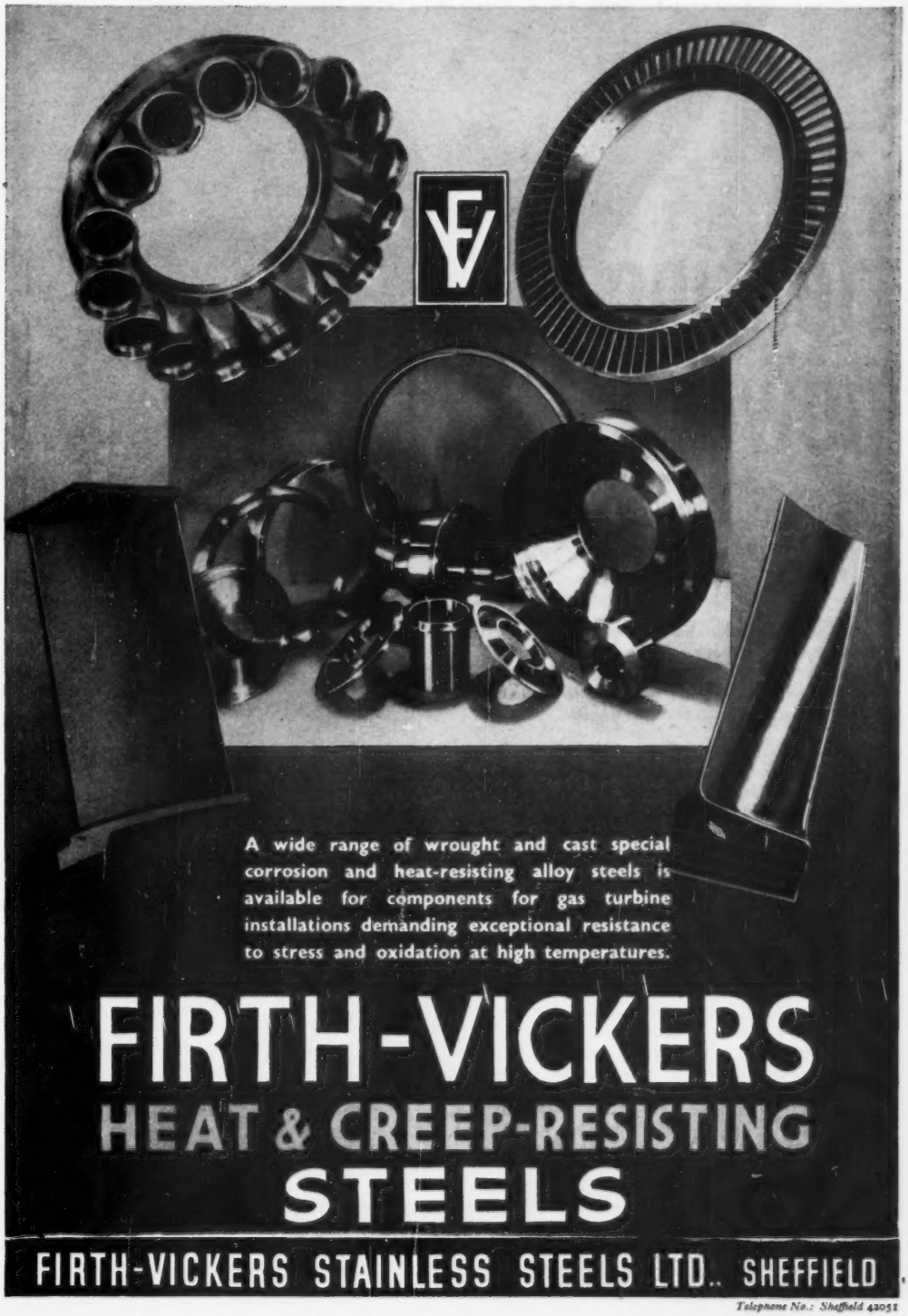
VERSATILITY

BOULTON PAUL HIGH FIDELITY POWER CONTROL UNITS ARE USED IN THE SAUNDERS ROE 'PRINCESS' FLYING BOAT AND IN A NUMBER OF BRITAIN'S LATEST SERVICE AIRCRAFT.

BOULTON PAUL AIRCRAFT LTD.

WOLVERHAMPTON, ENGLAND


R·F·D
COMPANY LTD
GODALMING SURREY ENGLAND
TELEPHONE GODALMING 1481
CABLES AIRSHIPS GODALMING
Balloons
PARACHUTE TRAINING*
BARRAGE and CONVOY


A wide range of wrought and cast special corrosion and heat-resisting alloy steels is available for components for gas turbine installations demanding exceptional resistance to stress and oxidation at high temperatures.
FIRTH-VICKERS
HEAT & CREEP-RESISTING
STEELS
FIRTH-VICKERS STAINLESS STEELS LTD., SHEFFIELD

Telephone No.: Sheffield 42051

floating power

There's tremendous holding power in the slender shroud lines of a cargo chute as it floats its vital cargo gently down to earth . . . the power to deliver men and materials, in peace or in war, to any point in the world . . . on time and on target!

Teamed with the cargo plane in a transportation unit unparalleled for swiftness and sureness, the cargo chute delivers howitzers, jeeps, lifeboats to fliers forced down at sea, steel girders for bridges, critically needed food and medical supplies . . . any cargo . . . to points that no other transportation could possibly reach!

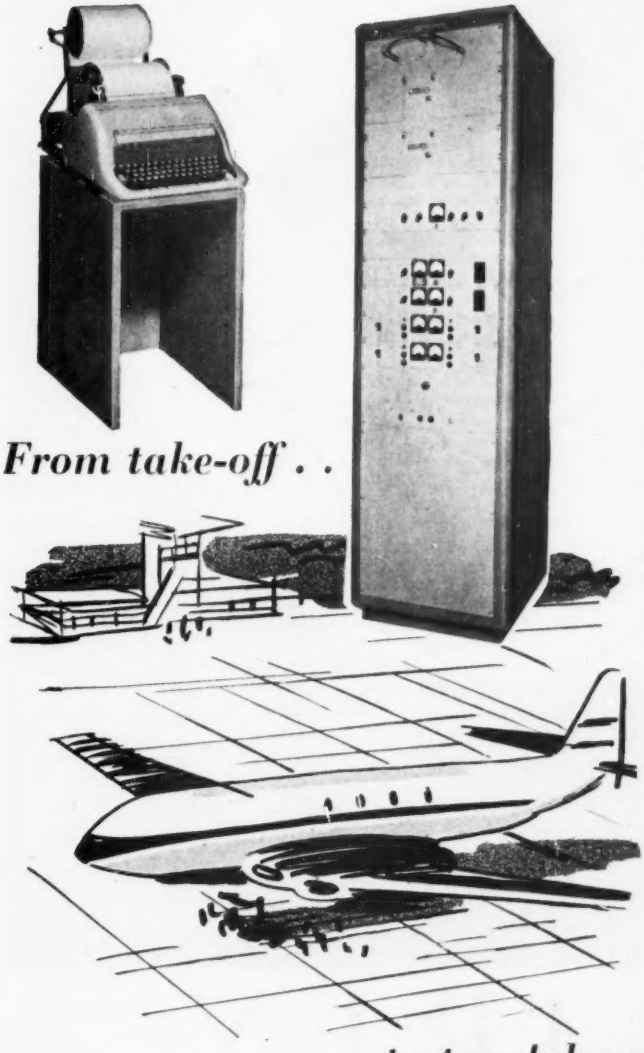
The superb record of the cargo chute in war points the way to accomplishments in peace time that are equally spectacular. In peace time, as in war time, the Pioneer Parachute Company's vast facilities for research, engineering and building of parachutes serve the U. S. Armed Services and the aviation industry to develop new techniques and improvements that constantly further the usefulness and effectiveness of the parachute.

PIONEER PARACHUTE COMPANY, INC.
MANCHESTER, CONNECTICUT, U. S. A.
CABLE ADDRESS: PIPAR, Manchester, Conn., U. S. A.

PARACHUTES MAKE THE DIFFERENCE!

Redifon

RADIO COMMUNICATIONS



From take-off . .

. . to touchdown

From take off to touch down modern airliners rely on radio. Their navigation and communication depends on the networks of ground radio stations serving all routes.

Redifon make world-wide contributions to these services. In every continent are Redifon transmitters providing communication and navigational beacon facilities: telephony and telegraphy circuits, with both fixed and variable tuned Redifon receivers, are also used.

Now come new frequency shift Radio Teleprinter transmitting and receiving terminals for long and medium distance, high-speed, point to point services, with multiple frequency channels, diversity reception and all necessary ancillary equipment.

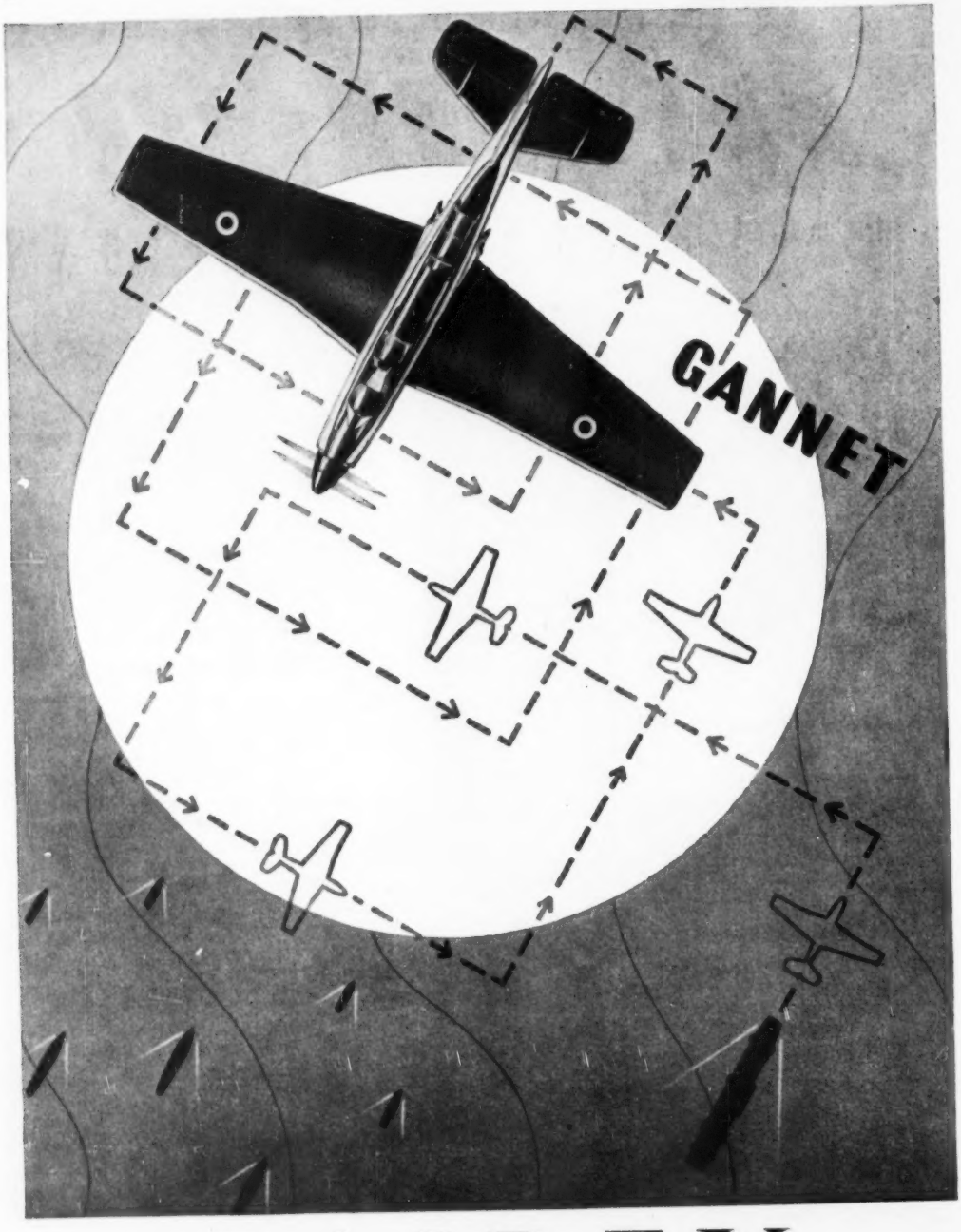
Now also the new Redifon 2 kW. transmitter, providing up to four remotely selected channels, is coming into use on the Comet routes for long range radio telephony.

In the aircraft, the new Redifon A.R.B. approved passenger announcement and entertainment system adds to interest and comfort.

The illustrations are of a typical frequency shift radio Teleprinter receiving Terminal and a page Teleprinter.

REDIFON LIMITED. BROOMHILL ROAD, LONDON, S.W.18. *VANdyke 7281*

B



FAIREY

THE FAIREY AVIATION CO. LTD · HAYES · MIDDLESEX

FLIGHT
and
AIRCRAFT ENGINEER

First Aeronautical Weekly in the World

Founded 1909

No. 2291 Vol. LXII. FRIDAY, 19 DECEMBER 1952

EDITOR
MAURICE A. SMITH, D.F.C.

ASSISTANT EDITOR
H. F. KING, M.B.E.

ART EDITOR
JOHN YOXALL

Editorial, Advertising and Publishing Offices:
DORSET HOUSE,
STAMFORD STREET,
LONDON, S.E.1.
Telegrams, Flightpress, Sedist, London.
Telephone, Waterloo 3333 (60 lines).

Branch Offices:

COVENTRY
8-10, Corporation Street.
Telegrams, Autocar, Coventry.
Telephone, Coventry 5210.

BIRMINGHAM, 2
King Edward House,
New Street.
Telegrams, Autopress, Birmingham.
Telephone, Midland 7191 (7 lines).

MANCHESTER, 3
260 Deansgate.
Telegrams, Iliffe, Manchester.
Telephone, Blackfriars 4412 (3 lines).
Deansgate 3595 (2 lines).

GLASGOW, C.2.
26b Renfield Street.
Telegrams, Iliffe, Glasgow.
Telephone, Central 1265 (2 lines).

SUBSCRIPTION RATES
Home and Overseas: Twelve months £3 3s. 0d. U.S.A. and Canada, $10.00.
BY AIR: To Canada and U.S.A., six months, $16.

IN THIS ISSUE:

Naval Helicopters for Malaya - - - 746
Torture for Tyres - 751
The Virtues of Simplicity 753
Helicopter Ground Testing - - - - 756
Latin-American Tour - 760
848 Squadron Works Up 761
Coral Route - - - 762
The McKenna Trophy Dinner - - - 763

Guidance for Bombs

"WE have got to get away from this free-falling-bomb business and put as much effort as we can into the guided bomb as quickly as possible." These are not the words of some chairborne theorist but of the practical-minded Commander-in-Chief of Bomber Command. His sentiments will, of course, be echoed by everyone possessing even rudimentary knowledge of the bombing problem as it is presented today; but the full magnitude of that problem can only be grasped by those who—like the C-in-C. himself—have had first-hand experience. These initiates will be only too well aware that a 1,000 lb bomb having a terminal velocity of some 500 kt takes about a minute to reach the ground when released from 50,000ft at a speed of 600 kt—in other words, that the modern bomb-aimer might have to release between eleven and twelve miles short of his target. They will be painfully conscious, too, of the mounting complexity of electronic target-locating and bomb-sighting equipment—a complexity which still leaves a heavy burden of responsibility on the harassed bomb-aimer; and it will not have escaped their notice that ground defences are generally grouped around the target area. A weapon greatly to be desired, therefore, is the guided bomb—which, theoretically at least, permits attainment of the proverbial "bang-on" accuracy from a relatively safe distance, and which might conceivably reduce the bulk or complication of associated gear on the launching aircraft.

What, then, are the possibilities of its being made available for use with the Valiant and Vulcan, if not with the Canberra?

Adverting to Sir Hugh Lloyd's recent utterance, we notice this brief but significant qualifying sentence: "I am sure it can be done." From this we may deduce (1) that guided bombs are not yet available to Bomber Command; (2) that there remains some question as to their feasibility. Against these deductions may be set the known facts that guided bombs were employed in the late war by Germany and America, and that post-war development in the U.S.A. has not lapsed (the latest example, we believe, is the Bell XB-63 Rascal, developed on the lines of the supersonic X-1 air-launched research aircraft).

Detailed knowledge of British research is, quite rightly, denied us; but we are surely entitled to suppose that the guidance of bombs is no new field of investigation for our armament technicians, for to them, as to the men who design and man our new bombers, we look for the fashioning of the "rapier" which, we are told, must supersede the erstwhile "bludgeon" of Bomber Command.

Britain's Background

As readers of Professor A. M. Low's article in *Flight* of October 3rd will be aware, Great Britain was the first nation to develop a guided aerial weapon—in 1918. That particular example was not air-launched, but experiments with a variety of guided weapons are known to have continued intermittently between the wars and a heartening success was certainly achieved with the Queen Bee, Queen Wasp and Fairy Queen radio-controlled targets. Even so, there was no little surprise and alarm when Hitler's Heinkels and Junkers began to launch their Hs 293 and FX controlled bombs against Allied shipping. True, these were of relatively crude design, but captured specimens taught our experts something they did not previously know concerning control and propulsion. In later years a certain amount of information was forthcoming from America on experimental bombs. Some of these were radio-controlled in range and azimuth, and at least one, the Roc, was television equipped; but we cannot be sure that particulars of later developments along these lines have found their way to these shores. It was rumoured that the Canberra which flew out to Australia last August was equipped for experiments with guided bombs, and there is no reason to suppose that these—if the rumour were true—would have been other than British in origin.

Whatever the present state of guided-bomb development in the British Commonwealth (for we must not forget potential contributions of Australia and Canada) the immediate point is that "C-in-C. Bomber" wants guided bombs, and somebody must see to it that he gets them. Otherwise that rapier for which he has striven so energetically may turn out to be a mere foil.

NAVAL HELICOPTERS FOR MALAYA

A New Squadron is Formed at Gosport

STATEMENTS made in the House of Commons are not invariably followed by immediate and effective action. A notable exception, however, has been the rapid working-up of the Royal Navy's first operational helicopter squadron, following the delivery of ten Sikorsky S-55 machines from the U.S.A. under the Mutual Defence Assistance Programme. On November 17th, in reply to a question on the action being taken to increase the number of helicopters available for anti-bandit operations in Malaya, Mr. Nigel Birch (Parliamentary Secretary to the Ministry of Defence) stated that the U.S. Government had agreed to advance the delivery date of these ten machines, originally to have been allocated in 1953. Only three weeks after this statement, No. 848 Squadron was ready to embark in H.M.S. *Perseus* for service in Malaya.

The squadron's base for their intensive period of familiarization and operational training on the S-55s had been H.M.S. *Siskin*, the Royal Naval Air Station at Gosport, where, shortly before embarkation, we were able to visit the new unit and fly in their aircraft. The squadron, commanded by Lt. Cdr. S. H. Suthers, D.S.C., R.N., was formed on October 29th, and the helicopters, delivered to this country by sea, arrived on November 21st. The high standard of piloting skill and maintenance efficiency achieved in the 17 days between that date and the occasion of our visit was an impressive reflection of the hard work put in by all members of the squadron.

Escaping from the still-persisting London fog, we found misty morning weather on arrival at Gosport, as the ground crews brought out the large, ponderous-looking machines and lined them up near Siskin's dummy carrier-deck and island. The machines were U.S. Marine Corps versions of the S-55, and carried the Marines' designation HRS-2 in small letters above the manufacturers' number at the forward end of the tail-rotor boom. They were finished in a dark blue colour, with the roundels painted on the boom fillets. The most notable design-feature is the arrangement of the nose-mounted Pratt and Whitney R-1340 engine, with drive shaft sloping up and back to the main gearbox, at the base of the rotor pylon. The clamshell doors in the nose, like those of a scaled-down Bristol 170, open to give an excellent engine accessibility from the ground and, indeed, the trouble-free maintenance of the machine as a whole is well liked by the ground crews.

The machines are fitted with M.F., H.F. and V.H.F. radio equipment, the respective loop, line and sword-type aerials being fitted above the cockpit, below and above the boom. Ten passengers can be accommodated on canvas-covered tubular framed benches, with individual safety-straps, along both sides and across the front end of the main cabin. Behind the rear wall of the cabin is a space for baggage, located above the radio equipment installation. A makers' plaque inside the framework indicated that these particular machines were from Sikorsky's October production line.

The Commanding Officer, Lt. Cdr. Suthers, has been a helicopter pilot since 1949, and prior to his appointment to No. 848 Squadron, was C.O. of 705, also based at Gosport. Westland-Sikorsky S-51s formed the equipment of this unit, engaged in helicopter conversion and other general duties. Lt. Cdr. Suthers will be remembered for his attempt, defeated by bad weather, to rescue Capt. Carlsen and Mr. Dancy from the *Flying Enterprise* early this year. He was also remembered by the writer (as, doubtless, by many other war-time Naval cadet pilots who trained in the U.S.A.) as the Senior British Naval Officer at the primary training base at Bunker Hill, Indiana, some eight years ago.

In an interview, Lt. Cdr. Suthers said that he expected the squadron to stay in Malaya for about a year, and to be engaged on rescue, casualty evacuation, reconnaissance and general transport duties. The unit would come under the operational control of the R.A.F., and would operate together with the S-51s of the Far East Casualty Flight. The personnel of the squadron comprises seven two-man aircrews (seven pilots, two commissioned observers and five C.P.O. aircrewmen), one engineer and one electrical officer, and some 87 ground personnel. All the pilots had completed the normal helicopter course on S-51s and, using a visiting machine from Westlands, had converted on to the S-55; while four of the

An S-55 in hovering flight frames seven others of 848 Squadron in the line-up at Gosport. On the right is seen the station's dummy carrier-landing strip. Two days after this photograph was taken, the squadron embarked by air on H.M.S. "Perseus," bound for Malaya.

The final formation flight mentioned in this article. The S-55s cruise at 86 m.p.h. and have a range of 470 miles.

"Flight" photograph

Taken from the leading aircraft in the formation shown above, this air view shows Lt. R. Taylor keeping station at 200ft over Gosport.

pilots had further extensive experience of helicopter flying. The working-up period had included practice in landing among trees and in restricted areas of the New Forest.

From a discussion which followed with the squadron's pilots, it appeared that they were all well pleased with the new aircraft. For a practical demonstration of the S-55's handling performance, Lt. R. Taylor agreed to give us a short flight, prior to the formation flying scheduled for the afternoon. We climbed into the cockpit from the main cabin; normally the outer steps fitted on both sides of the machine are used by the crew, but the cockpit-cabin communication is a useful operational advantage. In the cockpit, dual control is fitted, but the only instruments repeated at the port-side co-pilot's position are those showing the engine and rotor revs and the manifold pressure.

The start-up and take-off were smooth, and all through the flight the absence of undue vibration was noticeable. Differences from the S-51 include a shorter arc of travel on the collective-pitch lever, and the provision of an electric control in the cockpit for fore-and-aft trimming by means of the tail stabilizing surfaces. Any thoughts that the bigger machine would be less manœuvrable than the S-51 were dispelled most positively, as we moved up, down, sideways and round with the smoothest co-ordination and precision. Before returning to the line, Lt. Taylor made what was the most amazingly gentle landing we have ever experienced; in fact it was our belief at the time that we were still hovering, when in fact the landing had already been completed.

In the afternoon, a massed fly-past was made by nine machines of 848 Squadron and eight S-51s of 705 Squadron, before Rear Admiral C. R. L. Parry, Flag Officer, Ground Training. First of all the big machines eased themselves into a few feet of air and floated over to join 705 Squadron near the control tower. Then, as if pulled by invisible strings, the seventeen rotorplanes rose vertically and simultaneously, and performed their equivalent of the press-ups of a P.T. class, with the "small 'uns at the front, big 'uns at the rear." They then moved off into the haze to the east of the airfield.

Five minutes later, a straggling "W" shape of large and small dots could be seen coming from the west. The noise gradually increased, and the droning, bizarre flight of strange-shaped insects turned into an organized helicopter formation, two groups of four S-51s preceding three flights each of three S-55s. Several runs across the field were made, the precise position-keeping and stability of the helicopters being unexpectedly good. After the main formation flight, we flew with Lt. J. E. Breese in the leading machine in a formation of three S-55s (the remaining pilots being Lt. R. Taylor and Lt. L. D. Hawkes), which demonstrated once again the docile handling qualities of this aircraft.

The squadron embarked by air in H.M.S. *Perseus* (which was carrying a squadron of Sea Furies also) on Tuesday, December 9th, and will probably have sailed by this date. Their appearance in Malaya cannot help but be a direct and important contribution to the campaign against the terrorists there, as General Sir Gerald Templer, the High Commissioner, has realized in personally asking for them to be sent. While awaiting with interest news of their operations, it is good to learn that helicopters of this useful size and type are beginning to come off the production line at Westlands, where three are expected to fly before the end of the year.

SIKORSKY S-55 DATA
(Pratt and Whitney R-1340 S1H2 Wasp)

Dimensions	
Main rotor diameter	53ft
Tail rotor diameter	8ft 8in
Fuselage length	41ft 8¼in
Height overall	14ft 8in
Weights	
Weight empty	4,550 lb
Maximum disposable load	2,285 lb
Maximum weight loaded	6,835 lb
Performance	
Maximum speed at s.l.	110 m.p.h.
Cruising speed (70 per cent power) at 1,000ft	86 m.p.h.
Maximum rate of climb at s.l.	1,100ft/min
Vertical rate of climb at s.l.	300ft/min
Range (with reserve)	470 miles

FROM ALL QUARTERS

Hawker Hunter F.2

SUPER-PRIORITY orders have already been placed for a new version of the Hawker Hunter intercepter illustrated here. It is powered with an Armstrong Siddeley Sapphire turbojet and is designated as above. The mark of Sapphire specified may not be stated, though it has been disclosed that one mark has been type-tested at 8,300 lb thrust—the highest type-test rating so far recorded. Mr. Neville Spriggs, Hawker's general manager, has stated that, although the Hunters so far have done extraordinarily well, the airframe is capable of use with a much more powerful engine. He added that the F.2 model will be faster and will have a longer range than any of the previous prototypes.

The first flight of the Sapphire Hunter took place at Dunsfold some days ago. With Neville Duke at the controls it was airborne for 20 minutes and is said to have behaved "perfectly."

Externally, the new prototype, which is serial-numbered WB202, can be distinguished from its predecessors by its silver finish, slightly longer nose and a somewhat modified cockpit-fairing—possibly allowing a wider range of rearward vision. The shape of the lower portion of the fin is similar to that of the original prototype, WB188, and has no radius as on WB195, which flew at Farnborough this year. There is a suppressed aerial in the tip of the fin.

Shorts Appoint Helicopter Designer

SOME interesting speculations are prompted by the announcement that Short Brothers and Harland, Ltd., have appointed an assistant designer who "is to be responsible for the design and technical aspects of rotary-wing aircraft."

The man chosen for the post is Mr. John V. Roberts, A.R.Ae.S., who was born in London 45 years ago and educated in Australia. After serving an apprenticeship with the Larkin Aircraft Supply Co., he returned to England in 1932 and worked for Faireys and Saunders-Roe. In 1934 he became technical executive to Mr. Raoul Hafner and worked on the development of the A.R.III gyroplane, which first flew at Heston in 1935, and was subsequently acquired by the Royal Aircraft Establishment.

Mr. Roberts joined the Air Ministry in 1938 and at the beginning of the war was seconded to the Ministry of Aircraft Production, who appointed him assistant resident technical officer at Airspeeds. He was there during and after the war until, in 1948, he was transferred as R.T.O. to Short Brothers and Harland at Belfast. Mr. Roberts is the holder of a private pilot's licence.

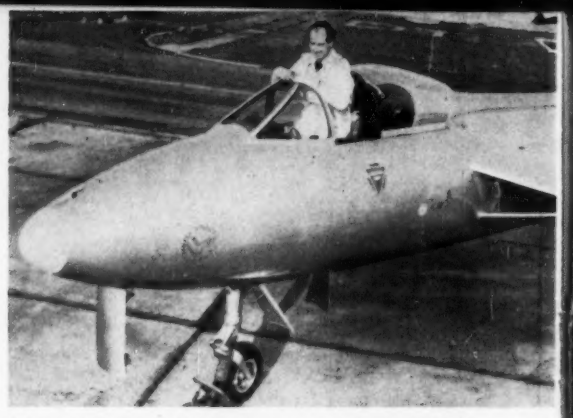
A Well-merited Honour

IT was announced last Tuesday that Captain R. C. O. Lovelock, D.F.C., has received the Queen's Commendation for Valuable Service in the Air. The award is in recognition of the skilful forced landing which Capt. Lovelock executed in France on July 23rd, when an Airwork Hermes IV, which he was flying on a trooping service from Blackbushe to Malta, with 54 soldiers and six aircrew on board, lost its starboard outer airscrew. The starboard inner was also put out of action.

The pilot put the aircraft down in a field, skilfully avoiding a number of obstacles, and all the occupants were able to escape before the outbreak of a fire which destroyed the aircraft. The fact that the Hermes cabin was fitted with rearward-facing seats no doubt contributed to the fortunate outcome.

Captain Raymond Colin Oswald Lovelock, now 40 years of age, started his career in the Merchant Navy and joined the Royal Air Force in 1936. During the war he commanded flying-boat, coastal Beaufighter and Mosquito squadrons; his D.F.C. was awarded in March, 1943. On demobilization he chose civil aviation as a career in preference to continuing with a permanent commission. He joined Airwork in 1947 as first officer and was promoted to captain in 1948. He is now Flight Commander of 622 Squadron, R.Aux.A.F. (Airwork's squadron), thus maintaining his interest in Service aviation. He has over 7,000 hours in his log-book. Married, and with two children, Capt. Lovelock lives at Fleet, Hampshire.

Readers may recall that during the past few years he has contributed a number of articles on civil aviation subjects to our pages.

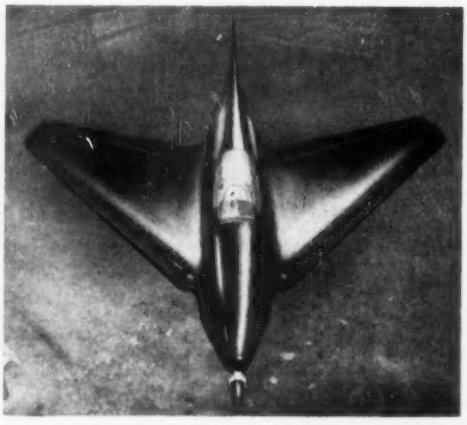


NEVILLE DUKE last week added a new variant to his log-book. It is—

Three-year C.s of A. for Private Aircraft

ONE of the most encouraging pieces of news received by the private owner since the end of the war is contained in last week's M.C.A. announcement that Certificates of Airworthiness for business and private aircraft with an all-up weight not exceeding 3,500 lb can, in future, be made valid for three years. This concession, effective from December 5th, represents a very considerable saving in costs of overhaul, as the aircraft concerned have previously required complete overhaul for renewal of C. of A. every year. The new certificate will be issued on the following conditions: (1) the aircraft to be inspected and maintained in accordance with a schedule approved by the A.R.B.; (2) inspection and maintenance to be certified by a licensed aircraft maintenance engineer employed by an approved firm or flying club; (3) records of inspection and maintenance to be made in the aircraft and engine log-books and to be shown to the A.R.B. when the C. of A. comes up for renewal.

The concession is, clearly, based on accumulated A.R.B. experience as to the safety of light-aircraft operations in relation to maintenance periods. The latest figures show that there are only 395 private and business aircraft holding current C.s of A. There are a number of obstacles to private ownership of which one of the most important is the cost of the annual C. of A. overhaul. For three representative types of light aircraft—Autocrat (1,850 lb), Gemini (3,000 lb) and Proctor (3,500 lb)—the labour-cost alone might work out at, respectively, £45-£50, £75 and £75-£80. The effect of the new concession is, of course, to spread this expenditure over three years instead of one. Further saving will result from the reduced A.R.B. fee of £5 for all types of private aircraft under 3,500 lb. Inspection of airframes and engines during the three-year period will be carried out according to a new R.Ae.C. maintenance schedule. Full entries of all inspections will, of course, have to be made in the aircraft and engine log-books, and the A.R.B. will be strict in enforcing this rule. There will, however, be a slight increase in the total cost of a "pre-entry" overhaul for a three-year C. of A., compared with that of the annual C. of A., since a number of extra items will be inspected to ensure reliability over the whole period. The concession, it should be emphasized,



ALWAYS ORIGINAL, the French designer, M. Payen, who works near Paris, has now produced this tiny delta research aircraft. Powered by a turbojet of 350 lb thrust—presumed to be a Turboméca Palas—it measures about 16½ft both in length and span, and weighs just over 1,000 lb.

—THE HUNTER F.2, a Sapphire-powered development, the first picture of which appears above. Brief details are given in a news item opposite.

applies only if the aircraft is registered in "Sub-division (d) Private"; this permits the machine to be owned by an individual, two or more persons, or a firm, provided that it is not flown for hire or reward. If at any time during the second or third year of the three-year period the aircraft ceases to become a *bona fide* private aircraft, application has to be made forthwith for reclassification and renewal of its C. of A. Private owners intending to take advantage of the scheme should notify the A.R.B. (who, incidentally, will advise whether an aircraft qualifies if conditions are unusual) when they apply for issue or renewal of their C. of A.

The new R.Ae.C. servicing schedule, which may only be introduced following renewal or issue of the C. of A., consists of: (1) quarterly airframe check; (2) annual airframe check; (3) complete airframe overhaul every third year; (4) ten-flying-hours engine-check (not certifiable); (5) minor engine check; (6) major engine check. Appendices "A" and "B" set out the check and overhaul periods for engines, propellers, instruments and equipment. The schedule is issued free to members and associate members of the Royal Aero Club; for others the fee is 5s.

Sea Hawks by Armstrong Whitworth

PRODUCTION of the Sea Hawk naval fighter (Rolls-Royce Nene) is to be transferred from the Hawker company to another Hawker Siddeley Group member, Armstrong Whitworth. This move was agreed upon many months ago and Sea Hawk jigs and parts have been on the road to Armstrong Whitworth since August last.

The original arrangement, made in agreement with the Ministry of Supply, was for the Hawker production to cease with the end of the present contract, by which time aircraft built under the A.W. contract would already be forthcoming. But Hawkers later decided that production of the Hunter should be advanced with such urgency that the Sea Hawk transfer should take place forthwith. Accordingly, it was recently agreed with Armstrong Whitworth that the transfer date should be put forward, and this decision has been put into effect. Hawkers are now free to accord Hunter production the full weight of their resources.

It should be appreciated that this is just one of many reshuffles within the industry, all designed to further the interests of "super-priority" production and those aircraft for which great export potential is visualized.

New Dowty Director

A DIRECTOR of several subsidiaries of the Dowty group, Mr. F. J. A. Mangeot, A.C.A., has been elected to the board of the parent company. Born in 1911, he was educated at Westminster School. After a year at the French Institute in London, where he took a commercial course in two languages, Mr. Mangeot was articled to Price Waterhouse Co., chartered accountants, in 1928 and, after qualifying in 1933, remained with the firm until 1938.

In that year he joined Production Engineering Ltd., industrial management consultants, and worked with them until 1948, when he was appointed to the Dowty organization as chief accountant. He served in that capacity until election to the boards of the subsidiary companies—Dowty Mining Equipment, Ltd., Dowty Seals, Ltd., and Ashchurch Products (Realisations), Ltd.

Major C. C. Turner

FOR nearly 20 years—from 1919 to 1938—aviation correspondent of *The Daily Telegraph*, Major C. C. Turner, F.R.Ae.S., died in London on December 7th at the age of 82.

Charles Cyril Turner was one of the small group of journalists who specialized in aviation subjects in the earliest days and he was, in addition, a pilot of both balloons and aeroplanes; he held R.Ae.C. Aviator's Certificate No. 70. In November 1908 he was a passenger in the balloon in which A. E. Gaudron made a record flight of 1,117 miles from London to Mateki Derevni in Russia; the journey terminated when the balloon was brought down by an accumulation of snow and ice on the envelope. Among Turner's earlier balloon flights was one from London to Sweden in 1907.

On the outbreak of war in 1914 "C.C." was granted a commission and attached to the R.N.A.S. He was thereafter engaged chiefly on instructional and experimental work and subsequently he became chief instructor at the School of Military Aeronautics, Oxford.

After the war he was a passenger in the Handley Page O/400 on which, in February 1920, the late A. Cdre. H. G. Brackley was attempting a London-Cape flight, and which crashed—fortunately without hurt to its crew—in a forced landing near Khartoum.

Throughout his working life Maj. Turner was an indefatigable writer, producing numerous books in addition to his journalistic output. Some of these—such as *The Old Flying Days* (1927) have since come to be looked on as standard works on air history.

U.S. Military Jet Transport Plans

SPEAKING in Washington, recently, Lt.-Gen. Joseph Smith, Commanding General of the Military Air Transport Service, disclosed that Lockheed, Consolidated Vultee and Boeing were "actively studying" jet transportation for the Air Force. "System study contracts," he said, had been awarded to these three companies last spring, to compare reciprocating-engine, turboprop and turbojet transportation for use in the Air Force. Based on these studies would probably be the U.S.A.F.'s choice of future transport-aircraft types. Gen. Smith commented favourably on the Lockheed C-130 turboprop transport, now being built for the Air Force, and described the machine's development as "a major step" by the United States to move into jet-transport production.

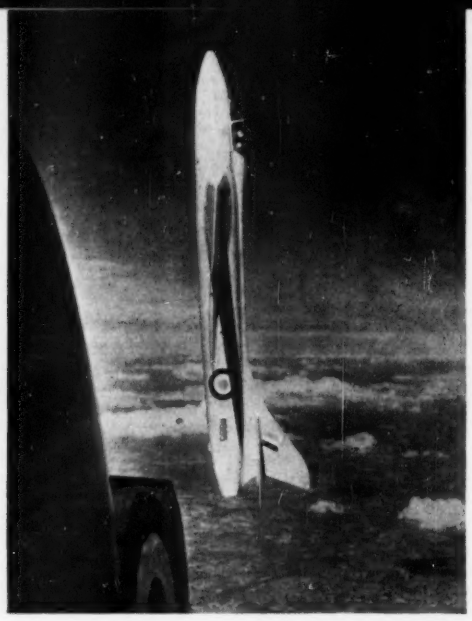
Effects of Efflux

A SYMPOSIUM on aerodrome requirements for jet aircraft was held recently in Montreal, as part of the Fifth Session of the I.C.A.O. Aerodromes, Air Routes and Ground Aids Division. The effect of jet aircraft operation on airfield pavements was discussed first: damage could be caused by the effects of blast, heat and spillage of jet fuel, which evaporated more slowly than aviation petrol and so had more time to affect the surface. The advantage of power plants mounted horizontally and not hung in pods near the ground was stressed. Other problems considered were the longer landing runs required by jet aircraft, the expense of taxying, and the minimum safe distance between running engines and other objects on the apron.

J. A. Prestwich

THE death of Mr. J. A. Prestwich, which occurred in London on November 28th at the age of 78 years, severs another link with the very earliest days of British aviation. It was John Alfred Prestwich who founded the famous Tottenham firm of motor-cycle engines which bears his name, and it was a 9 h.p. overhead-valve J.A.P. engine which enabled A. V. Roe (later Sir Alliott Verdon-Roe), with whom Prestwich was in partnership, to make successful flights from Lea Marshes in 1908; Roe's earlier attempts, with a 24 h.p. Antoinette engine at Brooklands, were in later years deemed to have been unsuccessful as "free flights." In much later years, J.A.P. engines have appeared from time to time as power units in ultra-light aircraft.

J. A. Prestwich was one of those comparative rarities—an inventor of infinite genius and, at the same time, an essentially practical engineer. In his early days he was a student under S. Z. de Ferranti, and by 1895 he was working on cinematograph experiments with the pioneer, W. Friese-Greene. Even at the age of 16 he had taken out patents for internal-combustion engines, and he started his own business when he was only 20.



WINNER : The Hunter photograph on the right secured a coveted award for Mr. Russell Adams (left, above), as related at the top of col. 3. With him is Mr. Cyril Peckham, holding an unorthodox new camera

HERE AND THERE

Welcomes Home

TO welcome back the No. 12 Squadron goodwill mission from South America, two receptions were held in London last week. On the Monday, Lord De L'Isle and Dudley, Secretary of State for Air, received guests in the Council Room at the Air Ministry, and on the next evening Sir George and Lady Nelson held a reception at Londonderry House. (Sir George is chairman and managing director of the English Electric Co., Ltd.) Both gatherings were attended by diplomatic and Service representatives of the Latin-American countries, and by senior officers of the Royal Air Force. Photographs of the Canberras, taken during the closing stages of the tour, appear on page 760 of this issue.

R.Ae.S. Discussion Postponed

THE Royal Aeronautical Society's full-day discussion on "Fatigue", to have been held yesterday, December 18th, has been postponed until March 27th, as arrangements could not be completed in time.

Netherlands-built Swifts ?

A REPORT from Holland says that, under licence from Vickers-Armstrongs Supermarine, the Swift is to be built by the Fokker works "in some hundreds" for the re-equipment of the Dutch Air Force. Part of the cost will be defrayed by America under the "off-shore purchases" programme. Other defence news from Holland is that K.L.M. are servicing Allison J-35 engines for all Thunderjets in use in Europe; it is expected that 150 units a month will be handled.

R.A.F. Entry for N.Z. Race

IN the House of Lords last week, Lord Gifford asked if the Government were contemplating any special action to ensure the real success of the England to New Zealand Air Race for Commonwealth prestige as a whole. The Secretary of State for Air replied that the Government had given the New Zealand authorities an assurance of their full support; he then gave a brief review of the race arrangements, and went on to say that the Air Council had decided that an entry should be made by the Royal Air Force; he hoped to make a statement shortly about the types of aircraft. He trusted that British manufacturers and operators would also respond to this fine conception and enter appropriate aircraft.

—and an R.N.Z.A.F. Entry

IT has now been confirmed that a Hastings of No. 41 Squadron, R.N.Z.A.F., has been entered in the Transport Handicap section of the New Zealand Race. It will be recalled that the squadron is equipped with Hastings C Mk. 3s which have a more powerful mark of Hercules (737s, giving 2,040 h.p. for take-off) than the standard Hastings used by Transport Command of the R.A.F. Reference was made to the differences between the types in an article published in *Flight* of February 8th.

"FLIGHT" FOR CHRISTMAS

ALTHOUGH next week's issue of *Flight* will be dated for December 26th, it will be on sale on Wednesday, the 24th. Special Christmas features will be included.

Norway's Six New Airfields

THE Norwegian Ministry of Defence now has construction works in progress totalling in value more than £5,000,000. These include under-mountain projects, building schemes and airfields. The military construction programme drawn up last January for the Ministry embraces the construction of two brigade camps, 11 staff headquarters, six new airfields and accommodation for 3,000 officers. The programme is to be completed by July, 1954.

Aerobatic Art

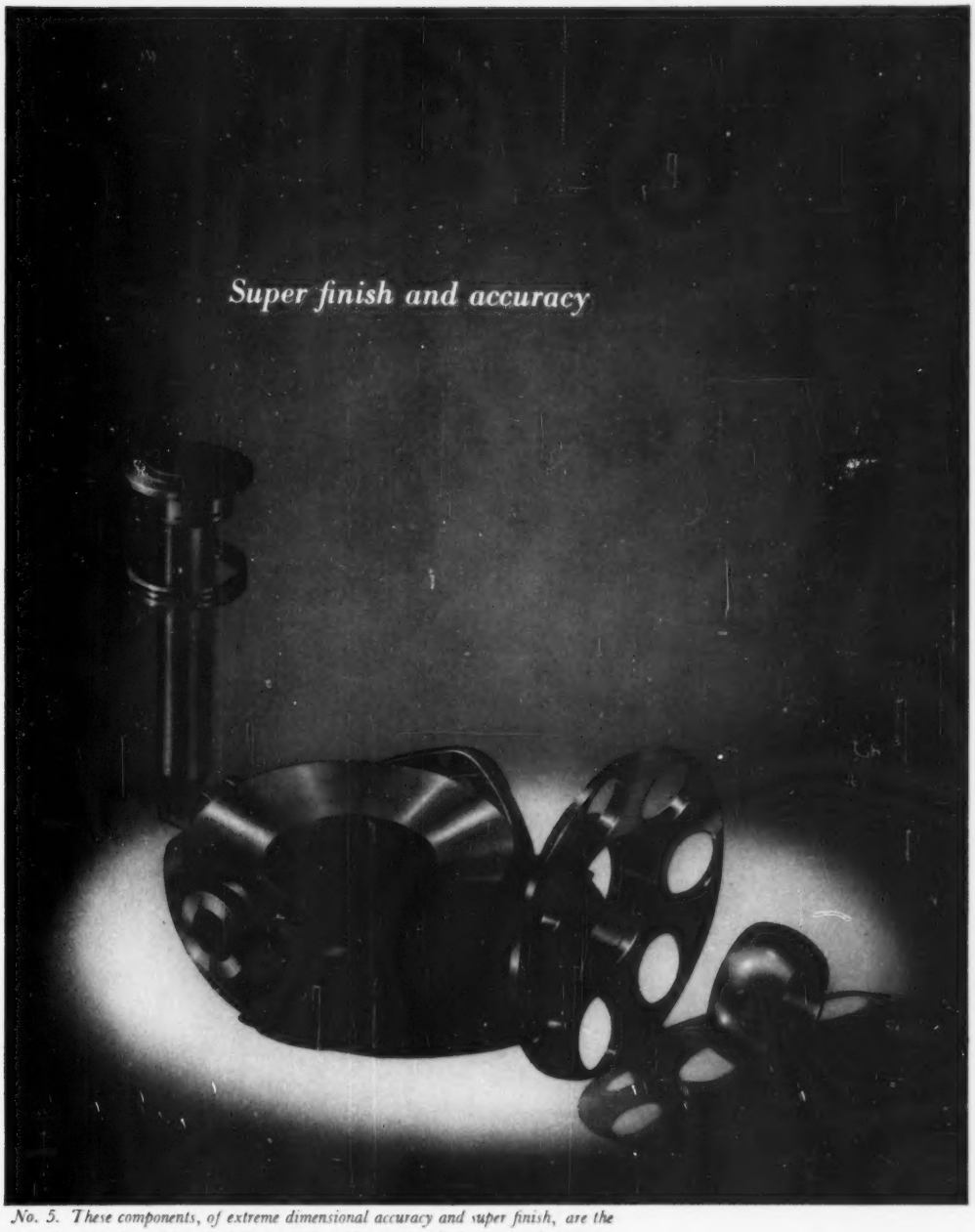
THE Hawker Hunter picture reproduced above has won for Mr. Russell Adams, A.R.P.S., one of the world's most coveted photographic awards—a cash prize of £50, a diploma, and an *Encyclopædia Britannica Year Book*—for first place in the "descriptive" class of the "Pictures of the Year" contest organized by the *Encyclopædia Britannica*. Mr. Adams is chief photographer to the Gloster Aircraft Co., Ltd., and deputy photographer to Mr. Cyril Peckham in the Hawker Siddeley Group. The prizewinning photograph—taken from a Meteor 7 flown by Gloster test pilot Brian Smith in close company with S/L. Neville Duke in the Hawker Hunter—was one of a remarkable series, three of which were reproduced in the photogravure section of *Flight* for November 14th. The camera which Mr. Peckham is seen holding in the portrait above is a remarkable weapon which he has designed and patented for air-to-air photography; it has lately been ordered in quantity for Service use.

Northern Flights

DURING the construction of the Danish weather-base "Station Nord" in Northern Greenland, aircraft of the U.S.A.F. flew over 1,000 tons of equipment to the base from Thule, 600 miles distant. Twenty-six large cargo aircraft were used over a period of six months, taking bulldozers, prefabricated buildings and other equipment to the site. The first landing was made by an advance party of Danes and Americans in a ski-equipped aircraft on April 5th; by July 25th an airstrip had been completed.

Unearthly Accuracy

MR. ARTHUR SOMMER, senior research engineer of the Arma Corporation, New York, has described a theoretical device which, he claims, would enable supersonic missiles to be sent "to any target on earth" with absolute accuracy. It would incorporate precision gyroscopic equipment which could not be jammed or otherwise misled; and indeed the only way in which a missile could be thrown off course would be for the path of the earth's movement to be changed. Mr. Sommer said that discussions were being held between his firm and the Air Force.



No. 5. These components, of extreme dimensional accuracy and super finish, are the operative parts in varying the delivery of the self governing high pressure fuel pump

FUEL AND COMBUSTION SYSTEMS FOR GAS TURBINE ENGINES

LUCAS

JOSEPH LUCAS (GAS TURBINE EQUIPMENT) LTD., BIRMINGHAM & BURNLEY

C

THE SHORT S.A.4

long-range, four-jet bomber

Shorts

THE FIRST MANUFACTURERS OF AIRCRAFT IN THE WORLD

Short Brothers & Harland Limited, Queen's Island, Belfast. *London Office: 17 Grosvenor Street W.1*

TORTURE for TYRES

The Dunlop Aircraft-tyre Test-house: Novel Ground-duty for a Merlin Engine

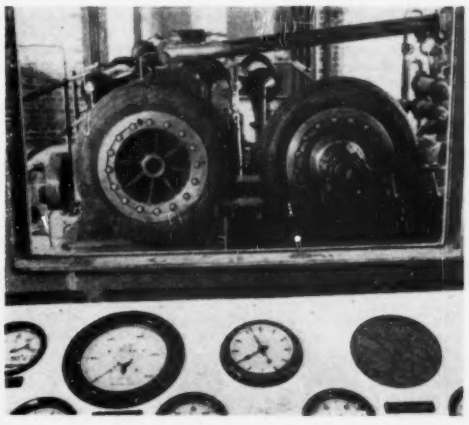
IN the past few years, increasingly high landing and take-off speeds, and heavier loads, have brought new problems for the aircraft-tyre manufacturer, particularly in the matter of performance-testing the products he designs to meet these new requirements. Where tyres are concerned, flight-testing is, clearly, one of the least satisfactory methods of obtaining performance data.

In modern (particularly military) aircraft, a heavy load must be carried on comparatively small tyres; in landing, this load is imposed suddenly, and greatly increased if the aircraft is "dropped," perhaps with a series of bounces that may bring even heavier intermittent shock-loads as flying-speed is lost. Moreover, high landing-speeds may require the wheels to be spun-up from rest to a rotational speed equivalent to well over 100 m.p.h. in, literally, a fraction of a second. Hence the puff of smoke so often seen during landings: some of it is from the runway asphalt; the rest is from the rubber of the tyre.

In America particularly, much attention has been given to the possibilities of pre-rotation of landing-wheels by electric motors; but the added weight and complication are formidable if the wheels are to be spun-up to more than a few hundred r.p.m.; and —we are assured by those who have studied the problem—a few hundred r.p.m. serves little useful purpose in a high-speed landing, the inertia of the wheel being only slightly reduced by comparison with that of a stationary wheel. Incidentally, some success has been achieved in spinning-up wheels, finned for the purpose, by airflow; but pros and cons are outside the scope of this article.

In the opinion of the development engineers of the Dunlop aviation division, the most practical solution to such problems lies in ensuring that, by sound design and materials, the tyre will stand up to its punishment, and with this aim in view they have designed and installed, at Fort Dunlop, Birmingham, a remarkable test-rig.

Already, as many of our readers know, the company has a formidable array of plant to test the vast range of tyres which it manufactures; but even the machine driven by a 150 h.p. electric motor and designed to test racing-car tyres at speeds up to 420 m.p.h. could not meet the requirements for "jet-age" aircraft tyres. As a measure of these changing needs, it may be said that whereas in the past a tyre inflated to 75 lb/sq in might have a ground-running speed of 100 m.p.h., new small-diameter, small-section types now under development are designed for a pressure of 250 lb/sq in and speeds of up to 220 m.p.h.



The test-end of the equipment as seen through the armoured-glass window of the control room. On the right is the pneumatically operated saddle which moves the test-tyre into contact with the revolving "runway." Normally, torpedo-netting surrounds this end of the rig.

A general view of the test-house interior, showing the neat installation of the Merlin. Note the massive water-cooled exhaust manifolds, and the blower-fan and air duct (in foreground) for cooling the ignition harness. In the background is the coolant-tank. The small motor in the right foreground drives an oil-pump for the test-shaft bearings.

The new rig, which can test tyres of 17 in to 37 in in tread diameter at speeds of up to 3,000 r.p.m. under variable loads reaching nearly 18,000 lb, requires so much energy that motors powerful enough to drive it would increase Fort Dunlop's peak electricity-load by some 10 per cent: and the works already consume as much current as a town the size of Reading. In any case, electric power would not be easily adaptable to the rapid speed-variations.

The decision was taken, therefore, to employ a powerful aircraft piston-engine, and Rolls-Royce, Ltd., co-operated by providing a reconditioned Merlin 724 S, with a maximum output of 1,725 b.h.p. at 3,000 r.p.m. and + 20 lb boost and a sustained output of 1,300 b.h.p. at 2,850 r.p.m. and + 14 lb boost.

Basically, the test-rig is simple. The Merlin, on a standard R-R engine test-bed mounting, transmits power from its airscrew shaft, running at 0.42 times crankshaft speed, to an increasing-gear of the same ratio, so that the test-rig power spindle runs at crankshaft speed. (To restore speed by this means required fewer structural modifications than would have been necessary had the R-R reduction-gear been dispensed with altogether.)

On the test-rig power spindle, and running on S.K.F. roller bearings, is carried a solid steel wheel, dimensionally similar to an aircraft wheel but stressed to withstand exceptional centrifugal and other loads over a long period of service. This wheel, shod with a heavy-duty tyre, represents the ground. The test-tyre is mounted on a similar wheel running on an idler spindle. The spindle is carried on a sliding saddle operated by a pneumatic ram, power for which is supplied by an independent 300 lb/sq in compressor unit. Thus, with the "ground" tyre running at preset speed, appropriate operation of the ram valves will cause the stationary idler tyre to be thrust forward into contact with it at any required load and either gently or violently.

This, then, is the "landing," and bounces can be simulated by immediate retraction of the saddle, followed by one or more successive forward thrusts.

A range of idler wheels of various dimensions enables any required size of tyre to be tested. The present emphasis is on the testing of tyres rather than wheels, and, therefore, the idler wheels, like the driving wheel, are of solid steel in order to give an adequate safety-factor under extreme conditions. Later, in tests of a more routine nature, standard aircraft wheels will be used on the idler. The inertia of the heavy idler wheel naturally imposes high shear and abrasive loads on the tyre, and in some circumstances these may have an inherent test-value.

It will by now be realized that the Merlin is faced with load-fluctuations unlike anything met in the air. From standstill to 1,000 r.p.m. there is direct manual control of the throttle for starting, for warming-up and for various test conditions at low speed. Between 1,000 and 3,000 r.p.m., in which range most of the landing tests are made, a de Havilland c.s. airscrew unit has been ingeniously adapted to keep the engine speed constant under the violently fluctuating loads. In the event of accidental over-speeding—such as might occur were a tyre to burst or a wheel break up—an electronic cut-out earths the ignition circuits at 3,080 r.p.m.

Apart from the usual performance data, aspects of tyre behaviour which can be studied with the aid of the new rig include centrifugal growth, distortion under impact, "stationary wave"

TORTURE for TYRES . . .

phenomena, and deflection due to centrifugal stresses. Most of the tests fall into three categories, viz :—

(1) *Take-off cycles*, for which the tyres are fully loaded one against the other, then run up to take-off speed, the load meanwhile being progressively decreased to zero.

(2) *Landing tests*, by the method already referred to. The "bounce" cycles can be pre-set by automatic timers. It is proposed to develop the compressed-air valving system to give a still more accurate simulation of bounce loads.

(3) *Taxying tests*, at relatively low speeds, with brief bursts of acceleration, and of longer duration than tests (1) and (2).

Generally speaking, results are assessed by visual examination of the tyres; by physical measurement; and by temperature checking. Phenomena of an essentially transitory nature may be recorded photographically.

The tests are observed from an adjacent control-room, through a large window of double-thickness armoured plate glass. There is a very fully equipped control and instrument panel, and when the installation is completed it will be possible to control the whole of any test cycle from this panel; the ram compressed-air valves, for example, will be operated by Teleflex controls.

Ancillary and safety services are comprehensive. For example, there is a high-capacity cooling system, with heat-exchangers for the Merlin's glycol and lubricant; the ignition harness, at points near the exhaust system, is cooled by a cold-air blower system; under-floor service trenches have extractor-fans to keep them clear of fuel-air mixtures; and the test-house side-walls consist of large roller-blind shutters, which are kept open on one side or both in order to neutralize the blast effect should a tyre burst. The test-wheels are screened by torpedo-netting hung from the ceiling. A built-in CO_2 system, actuated from the control-room, and with discharge-nozzles at all danger-points, should effectively take care of any fire.

A point of interest which impressed itself during our visit was the extreme smoothness and quietness of a Merlin with no air-screw, and with its exhaust stubs led into an extensive water-cooled silencing system. The contrast, in comparison with such an engine running in an airframe or in a test-cell, was quite startling.

Chiefly concerned with the design, installation and use of the new equipment are Mr. M. J. Bartle, an ex-R.A.F. engineer officer, who is assistant to Fort Dunlop's equipment engineer, Mr. Harold Smith; Mr. J. I. S. Williams, test-house manager; Mr. H. R. Fletcher, chief aero-tyre designer; Mr. R. G. Clifton, i/c tyre-test development work; and Mr. R. J. Maclaren, who has had Naval Air experience of Merlin maintenance. R.E.C.

THE AVIATION BOOKSHELF

"Across the Space Frontier," edited by Cornelius Ryan. Sidgwick and Jackson, Ltd., 44 Museum Street, London, W.C.1. Illustrated. Price 21s.

THERE are few of us whose interest in the possibilities of space travel is average: either our imagination is completely captured, and we go to sleep thinking of orbital velocities and wake up muttering of space stations, or we are completely indifferent to the whole subject, if not actually repelled by its possibilities.

The former category should welcome this guinea's-worth with eager hands and eyes, and it may even make a few converts among the latter. It is an enlargement of a scientific symposium which appeared in *Collier's* magazine, and consists of contributions by American and other specialists whose qualifications we cannot doubt. Moreover, the integrity of the work is reinforced by an introduction from Sir Harold Spencer Jones, the Astronomer Royal, albeit he is a little critical of some of the writers' statements.

The level of "technicality" is uneven from chapter to chapter but, generally speaking, the book should not leave any intelligent schoolboy out of his depth, nor should its style offend the more advanced interplanetarian.

Outstanding are the fine colour illustrations by Chesley Bonestell and other artists.

"The Wonder Book of Aircraft." Ward Lock and Co., Ltd., 6 Chancery Lane, London, W.C.2. Illustrated. Price 12s. 6d.

EVEN those of us well past the middle of our allotted life-spans remember with affection the *Wonder Books* of trains and ships that, crackling excitingly in their paper wrappings, greeted us on Christmas mornings so long ago.

This new edition of *The Wonder Book of Aircraft* keeps up the tradition of lots of pictures, some in monochrome and a few in colour; big bold type; and a style ("turbojet and turboprop airliners demand a different operating technique") that doesn't patronise the young reader. It is, incidentally, confined to civil aviation: a companion volume deals with the R.A.F.

As in the past, the book seems to cover a vast field with satisfying adequacy. A nice present for any air-minded boy—or girl.

"Clear the Decks!" by Rear-Admiral Daniel V. Gallery, U.S.N. George G. Harrap and Co., 182 High Holborn, London, W.C.1. Illustrated. Price 12s 6d.

BY 1944, Allied naval forces in the Atlantic were taking no chances with damaged U-boats. Too many German commanders had decided to have one last fling, and, as Admiral Gallery comments in this book, "a salvo of six torpedoes fired just as the crew abandons the sub will scurry about with their doses of sudden death for twenty minutes." So, "When a cornered sub did surface all hell bust loose. Destroyers charged in at full speed, zigzagging wildly and blazing away with everything they'd got. Planes swooped down with machine-guns snarling. Depth charges, rockets, armour-piercing projectiles and torpedoes ripped into the surfaced sub from all directions. Maybe that U-boat came up to surrender, but you couldn't afford to jump to conclusions."

The captain of U-505 must, therefore, have been very surprised when he surfaced, ordered his crew to scuttle and abandon ship, and was greeted only by sufficient small-arms fire to encourage his men's hasty exit. It was nothing to the surprise Washington had when they received a message from Gallery to say that sailors from his task force had boarded and captured U-505, complete with its code-books, which gave the key to every intercepted German radio message to the U-boat fleet for the rest of the war.

Dan Gallery's crew were no longer surprised at anything! They remembered that he had made the first take-off and landing from their ship, the "baby flat-top" *Guadalcanal*, when the air group had decided there was insufficient wind for them to fly. And they had probably heard how Gallery, commanding a base in Iceland in 1942, had become so envious of seeing "C.B.E." and "D.S.O." after the names of British colleagues that he always wrote "D.D.L.M." after his own. Documents bearing this rare distinction penetrated scores of top-secret files until a very senior British officer discovered that it stood for the name and occupation of another character named Dan, famed in ribald song.

Those stories are typical of Gallery, and typical of his autobiography, which is one of the most entertaining, sincere and common-sense stories of World War II.

"Aeromodeller Annual 1952." Compiled by D. J. Laidlaw-Dickson and edited by C. S. Rushbrooke, F.S.M.A.E. The Model Aeronautical Press, Ltd., 38 Clarendon Road, Watford, Herts. Illustrated. Price 10s.

IF anybody should doubt the grip which the hobby, pastime, sport or science—call it what you will—of aeromodelling has obtained upon young and old (and of both sexes) we recommend him to explore this remarkable *vade mecum* on the subject.

From its pages you may learn (to pick a few points at random) the detailed constructional arrangement of the Letmo 17 Polish power model by Zdenek Husicka; how to make a ducted-fan model; how to talk modelling in French, German, Swedish and Italian; and who has won what in the numerous national and international contests of the past season.

Literally hundreds of illustrations in line and half-tone amplify the text-matter. Altogether a laudable effort, judged by any standards.

"The Poor Wise Man," by Daphne Slee. Peter Davies, Ltd., 38 Bedford Square, London, W.C.1. Price 10s 6d.

ON the dust-cover of this novel is printed a reminder that, when we reviewed Miss Slee's first book, we wrote: "It is seldom that a first novel justifies review in a technical journal; *That Great Hunter* is one of the exceptions." All too often a second novel fails to bear out the promise of the first, but in Miss Slee's case this is not so, because *The Poor Wise Man*, despite a somewhat flimsy plot, is a pleasant, moving little story with a high degree of technical accuracy.

The hero is chief test pilot of an establishment "something between a baby Farnborough and a baby Hatfield," where they design, construct and test prototype aircraft, "but in so rare, so Government-blessed an atmosphere that they do not think of themselves as touched by the vulgarity of commerce. Our boffins are Civil Servants; our director, Sir Alberic Bladon, is a retired air marshal; our test pilots are serving officers; our ground crews, God help us, are mostly National Servicemen and shave once a fortnight. For the rest, our site is well chosen, so that we nearly always have to take off over the town and annoy the inhabitants, and are u/s for approximately half the year because of sea mists."

Miss Slee's intimate knowledge of Service life, clever use of correspondence to emphasize the varying temperaments of her characters, and fine command of the English language (which she teaches) make this just the book for a quiet winter evening.

The Martin-Baker M.B.2 (special Napier Dagger III 24-cylinder H-type engine). Although the designation "M.B.1" can be seen on the fuselage, the M.B.1 was, in fact, a 160 h.p. two-seat civil aircraft which first flew in 1935.

THE VIRTUES OF SIMPLICITY

An Ex-R.A.F. Armourer Looks Back with Affection on the Martin-Baker Fighter

IN presenting this article for its intrinsic interest, we should make it clear that the Martin-Baker fighter was not so much a "light" fighter as one built on essentially simple principles. Using a steel-tube structural system developed from that of a 1935 civil light aircraft powered by a 160-h.p. six-in-line Napier Javelin engine, the M.B.2 (Napier Dagger III) described here was one of a series of five designs, four of which reached the prototype stage. It was chiefly notable for some ingenious and unorthodox structural features and, as the author says, for its adaptability to sub-contract methods of manufacture and ease of maintenance.

SAID a recent news-story : "The Government is watching with keen interest the development of a new jet aircraft. The cost of rearmament, particularly in the production of military aircraft steadily approaches a figure which may well be called 'crippling.' Already, the money which, at the outbreak of the last war covered the cost of a thousand fighters now only takes care of a hundred. The new jet aircraft, the product of a private venture, is the embodiment of a principle which concerns itself with three important essentials—engine, armament, electronics. The completed aircraft is built around these essentials of materials combining maximum lightness with high resistance to shock, fatigue and stress. Results so far achieved give complete satisfaction. Production costs are well below the limit of finance available to any private firm. The weight of the aircraft is materially less than that of its nearest counterpart. Its further development and final tests are the constant concern of Her Majesty's Government."

My reactions to the announcement were twofold. I immediately felt that I wouldn't like to fly in the new aircraft. Surely, too great an emphasis had been placed on lightness of construction with a view to reducing production costs, and too little on the safety factor at supersonic speeds? Then I rejected that impression.

Here was no crackpot idea; it had already interested the highest and most conservative technical authority. Suddenly, I recalled another unorthodox aircraft which, but for the untimely outbreak of the late war, might well have made a profound difference to the fighter strength of the Royal Air Force at that time.

It may be wise to point out here that I am not an expert in aircraft construction. I teach children far simpler skills. My memories of the aircraft, then, are those of an armament technician of the days before the war—a regular airman, one of a team assigned to test what still remains in my mind a remarkable machine.

The same aircraft in a modified form, this time with a more conventional fin and rudder. Note the retractable crash-pylon, here seen in the extended position. The oil cooler was in the port undercarriage-trouser; the intake can be seen. On the horizon is Heston's famous landmark.

The fighter was a prototype by the Martin-Baker Aircraft Company, a then-little-known private firm, and it began its Martlesham tests only a short while—for the conduct of such lengthy and exhaustive trials—before the declaration of war.

Mr. James Martin, whose brain-child it was, explained to those of us detailed to work on the fighter his reasons for producing it. He had aimed at cheapness of production by prefabrication. Almost every component of the airframe could be farmed-out to engineering firms unconnected with the aircraft industry. He had applied himself with equal concentration to the Service problems of working conditions and ease of maintenance on squadrons. And above these laudable considerations he had aimed at producing a front-line single-seat fighter capable of holding its own, in performance and safety, with the best in the world.

The result was an aeroplane unorthodox in appearance but delightful to service and a pleasure to handle, according to those pilots who tested it.

There was virtually no tail fin. A hinged end to the metal fuselage took over the work of a rudder. The undercarriage did not retract. Instead, the landing wheels were encased in long "trousers" which, by their streamlined rigidity, helped to stabilize the aircraft in flight. The cockpit enclosure was simply a fragile assembly of transparent plastic panes and, to prevent injury to the pilot in the event of a nose-over, a solid steel pillar, normally retracted behind the pilot, rose automatically to a height of about three feet immediately flying speed approached the stall. This tough projection ended in a large flat plate designed to resist ground penetration and so keep the aircraft weight off the up-ended pilot.

We of the ground crew could scarcely believe our good fortune in working on such a delightful machine. From my armament point of view everything had been made absurdly easy. There were four fixed machine-guns in each wing. I had no access-doors to baffle me with their exasperating locking buttons which wouldn't. One turn of a small handle and the whole upper surface of the wing stood up obligingly on end, allowing free access to the guns and ammunition. A trapezium section rubber-covered seat, which fitted along the rear of the gun bay, brought luxury to the job. It also eliminated, by its shape, the curve of the wing surface, and so provided a flat top for tools and so on. The guns and ammu-

THE VIRTUES OF SIMPLICITY . . .

nition tanks were locked in position with pins, conveniently looped, so that the removal of four guns and tanks took five minutes instead of at least fifty on any conventional fighter.

The fitter, the rigger, the instrument repairer were equally ecstatic; their work was made so carefree by the genius of Mr. Martin. The pilots came out of their terse shells to praise without qualification the machine's performance. We who stood near the hangars and watched its airborne evolutions—particularly at the hands of Captain Baker*, the firm's chief test pilot and colleague of the designer—believed we were helping to make a new page of aeronautical history.

And so we would have indeed, were it not for a man who, around that time, had decided to test by action a fanatic belief in his omnipotence. The Second World War burst upon us as a result, and the incalculable benefit of the Martin-Baker fighter was lost in an accelerated production of existing types.

At least, that's what I like to think happened. My contact with the machine was, of necessity, entirely unconnected with its design and any possible faults therein which might or might not have contributed to its disappearance from the scene. It is a fairly safe assumption, however, bearing in mind the good opinion in which the machine was held by Service technicians and pilots alike, that time would have ironed out any major defects—had any been present. And time was the one commodity of which we were tragically short.

Another "utility fighter" is now rumoured. I, for one, wish it well in its time of testing and trial. J. C.

* *Capt. V. H. Baker, D.F.C., who for several years had been chief instructor at Heston before joining the Martin-Baker Company. He lost his life in 1942 while attempting a forced landing in a later machine, the M.B.3. 54 years of age, he had been flying for nearly 30 years.—Ed.*

Our American Correspondent Reports . . .

THIS correspondent's previous report from the United States discussed the domestic airlines' high hopes for the future of the tourist-passenger trade. And some weeks ago we mentioned our fears in connection with the safety aspect of such high-density operations. The opinion was then expressed that even the new C.A.B. regulations might be insufficient to take care of the emergency evacuation of crowded aircraft under conditions of fire on the ground, or after ditching.

Last week this particular subject suddenly broke into the open only a degree less dramatically than if there actually had been such an accident. At the time of writing it looks as though the repercussions will be wide and angry, and will spread through Government and airline industry alike. For United Air Lines (sometimes rumoured to be less keen on tourist traffic than the others) announced that they were ordering a reduction in the number of passengers to be carried in their tourist aircraft because (said their president, Mr. W. A. Patterson) the present Civil Aeronautics Board regulations with regard to evacuation of the aircraft in an emergency were totally "inadequate."

Apparently their decision was based on the findings of a report drawn up by Cornell Aeronautical Laboratory, which is believed to have shown that it would take three minutes, or more, to get a minimum of 60 passengers out of a coach-type DC-4 in an emergency. Apparently the airline in question felt that so far the domestic carriers had all been lucky in not having had an accident of this nature (although a DC-4 was ditched off Puerto Rico with considerable loss of life). Actually, most of those crashes that have occurred so far and which resulted in fires on the ground happened on flights which were not carrying a full complement of passengers. Over two years ago the N.A.C.A. investigations and reports and films showed that in a ground accident which ruptures fuel tanks, a fire spreads with horrible speed and there is little chance of getting passengers out if the fuselage is enveloped.

• • •

BASED as it is on the argument of "safety," therefore, this attitude of United Air Lines cannot very well be ignored, for the public will always side with those whom they feel are taking action to protect them from the risks they still believe to be inherent in flying. It is an emotional appeal and therefore almost impossible to counter by statistics. But the other operators point out that, if they follow suit and reduce passenger-loads, they cannot make such a narrow-margin operation pay at the present low tourist fares. Thus they are faced with the prospect of making extensive—and expensive—modifications to their coach aircraft in order to improve emergency exits, aisle widths, fire prevention and crash switches and so on, or, alternatively, of carrying fewer people, or charging higher fares with, possibly, a reduction in traffic.

• • •

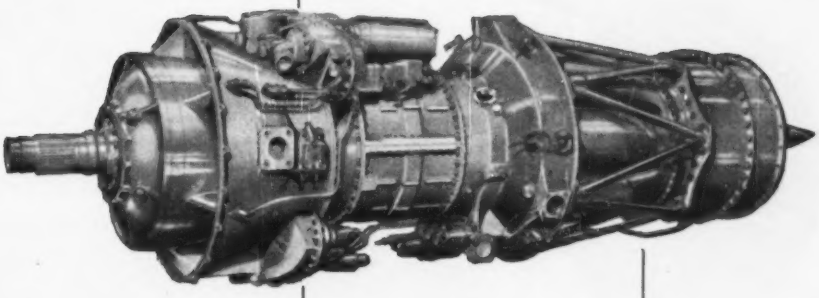
WHILE B.O.A.C. and B.E.A. go ahead with the operational flying of their turbine aircraft, talk and the printed word are still the form here. But advertisements in recent issues of the aviation Press show that rumour was right and that time is marching on, anyhow as far as the Boeing Airplane Company is concerned. This advertisement announced that the Boeing "Project X" (also called by some the Boeing "707") was an actual aircraft in the process of construction, and confirmed that it was a dual purpose design, one type being a "versatile military airplane for aerial refuelling and for cargo and troop transportation," and the other a "high-speed economically operating airline transport for passengers and cargo." The advertisement went on to state that the project had been under way for a substantial period of time and that "the prototype airplane—company-financed—will be completed and flying by 1954."

Thus Boeings have apparently stolen a march on their competitors further south in California, and will—in 1955, anyhow—be able to demonstrate an actual aircraft to the airline operators instead of discussing paper specifications. It is probably safe to say that, having learned the hard way with the B-47, they will have modified some of the original ideas on range, performance and undercarriage layout that were believed to be embodied in the original specification, and will come up with a pretty conventional, swept-wing, engines-in-pods aircraft of some 140,000 lb or so. Their chief difficulty may be to get suitable engines to take care of the weight required for the long-range version, and it's more than likely that the "demonstration" model won't have the power or range they want. But it will be a tremendous talking point to have something flying, and as the test and development stage would occupy at least eighteen months or two years, they probably hope to have suitable power plants for a commercial version by 1956 or 1957. As a recent estimate of the cost of design, testing and production of a new turbine civil transport was set—by one company executive—as high as "over fifty million dollars," the "company-financed" part of the Boeing statement really means something.

• • •

ON the talking side of the picture Mr. Floyd Odlum, one of the most powerful financial figures in the aircraft industry, and chairman of the Board of Consolidated Vultee, let fly in a speech in New York recently. Having expressed the belief that "all the commercial transports that have been built by American aircraft companies since the end of World War II, taken in the aggregate, represent a net loss to such manufacturers," he went on to say: "Given a release by the Government of the necessary plant space and personnel, Convair, just as an example, could have a commercial version of its B-60 ready by 1955. It would be a proven article. It would seat close on 200 passengers . . ."

At the end of the speech he further suggested that it was unpatriotic of Pan American Airways to put dollars into the British pocket, and therefore into the British Treasury, by buying Comets. This reasoning seems somewhat one-sided, particularly in view of the possible contributions to his own company and to the American Treasury as the result of sales of, say, Convairs to K.L.M. or Swissair. In the meantime, Comets and Viscounts pile up the hours, and there is bustle and the sound of riveting at Boeings.



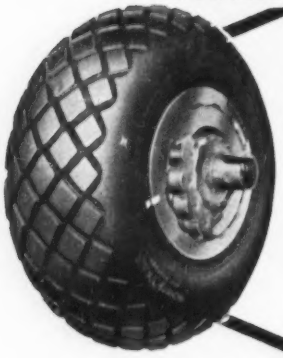
ELAND

A 3000 e.h.p. single-shaft gas turbine for single-rotation propellers developed to give exceptionally low fuel consumption — for example 0.49 lb/bhp/hr at 350 m.p.h. and 30,000 ft.

NAPIER

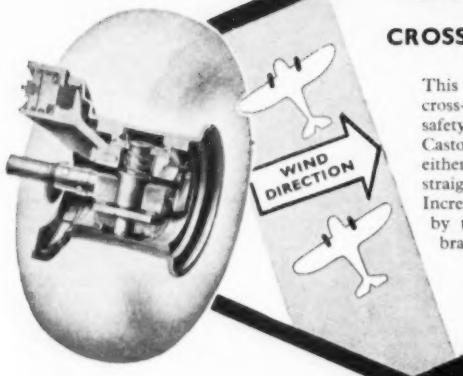
D · NAPIER AND SON LIMITED · LONDON · W.3

SAFETY ON TOUCHDOWN



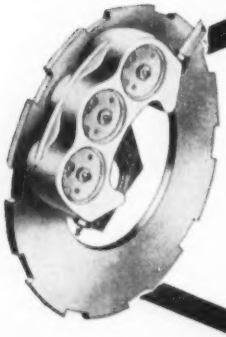
GOODYEAR
AIRCRAFT TYRES

Developed through years of research and testing, Goodyear aircraft tyres are built to "take it" on touchdown. Resistant to heat, fatigue and bruising, built to stand up to the impact of weight multiplied by m.p.h., they assure safety at today's high landing speeds. The All-Weather Tread illustrated is one of the variety of aircraft tyres, designed to give maximum reliability under all conditions.



GOODYEAR
CROSS WIND LANDING GEAR

This patented Goodyear device permits cross-wind landings or take-offs in relative safety, without any tendency to ground loop. Castoring wheels permit a yaw of 25° on either side of centre while maintaining a straight course along the runway.
Increased flying safety is further enhanced by the incorporation of the popular disc brake in this revolutionary castoring wheel.



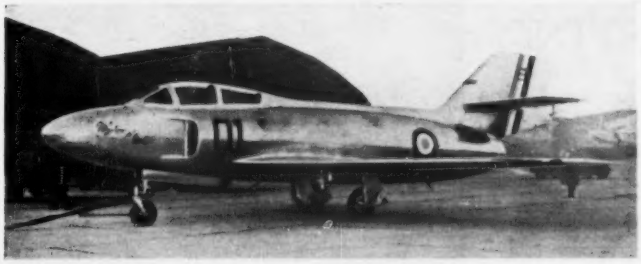
GOODYEAR
ORIGINAL DISC BRAKES

The Disc Brake was first introduced by Goodyear several years ago. Since then the knowledge gained from actual operating experience has been vigorously applied, and to-day, the Goodyear Disc Brake has a reliability unique in this field. They give the pilot real confidence in landing, and sensitive control in every ground manoeuvre. Here again, Goodyear Research and Enterprise are far in the lead.

YOU CAN TRUST
GOODYEAR
AVIATION PRODUCTS
FOR UTMOST RELIABILITY

THE GOODYEAR TYRE AND RUBBER COMPANY (GREAT BRITAIN) LTD., WOLVERHAMPTON

AIRCRAFT INTELLIGENCE



MYSTERY AND MONITOR : The first prototype of the Marcel Dassault 453 *Mystère de Nuit two-seat night fighter is seen in the upper picture—probably the best to date. This machine has been flown by American pilots at Mélun-Villaroche. The little piston-engined trainer below it is the Farman Monitor I, designed by M. Stampe. A note concerning it appears (right) under "France."*

Great Britain

Avro Vulcan. According to *Aviation Magazine* the rapidity of the construction of the prototype Avro delta bomber was made possible by the employment of the Fairey method of envelope-jigging, in which the aircraft is built "from the outside inwards."

U.S.A.

Beech SNB-5P. A substantial number of aircraft with this designation are to be built for the U.S. Navy; the type is a photographic development of the Beech 18 of 1938. Another Beech 18 version is in production in Canada as an R.C.A.F. crew trainer.

Boeing 707. Boeing are reported to have begun the manufacture of parts of their forthcoming jet transport. The Pratt and Whitney J-57 split-compressor engine is regarded as the certain choice for this project, and Boeing are reported to have rejected "fancy wing designs" (such as the crescent) in favour of the known B-52 pattern. The transport is to be developed as a civil and military passenger and freight carrier and as a tanker.

Convair B-36H. The world's biggest bomber will remain in production until 1954 at Convair's Fort Worth plant. The H version makes provision for a second flight engineer to help during take-off and landing and on long missions of up to 40 hr. Other improvements concern the radar and electronic equipment and the cockpit lighting. *Aviation Week* reports that the B-36 will be succeeded on the Fort Worth assembly-line by a Convair supersonic bomber, for which a production contract is being "processed" at Materiel Command H.Q. The report is linked with a recent official hint that other "essential work" of "substantial" quantity was planned for Fort Worth. Boeing, it is stated, were Convair's competitor for the multi-jet supersonic-bomber contract.

France

Farman Monitor I. Designed by (or at least with the aid of) M. Stampe, who was responsible for the incredibly manœuvrable S.V.4 biplanes well known on the Continent and in this country as the equipment of the *Patrouille d'Etampes*, the Farman Monitor I is a robust tandem-seat training monoplane. Already with 70 hours' flying behind it, it will soon be on its way to the Flight Test Centre at Brétigny. To increase manœuvrability in snap manœuvres the rudder originally fitted has been somewhat modified and enlarged. The engine is a 140 h.p. Renault, driving a Merville airscrew.

Dorand DH O II Helicopter. Under this designation a new four-seater helicopter, with jet-driven rotor blades, is being built. The basic power unit is believed to be a Turboméca Aspin ducted fan. Ground tests should begin early next year. The Dorand company, incidentally, is also working on flight simulators for fixed-wing aircraft and helicopters.

Holland

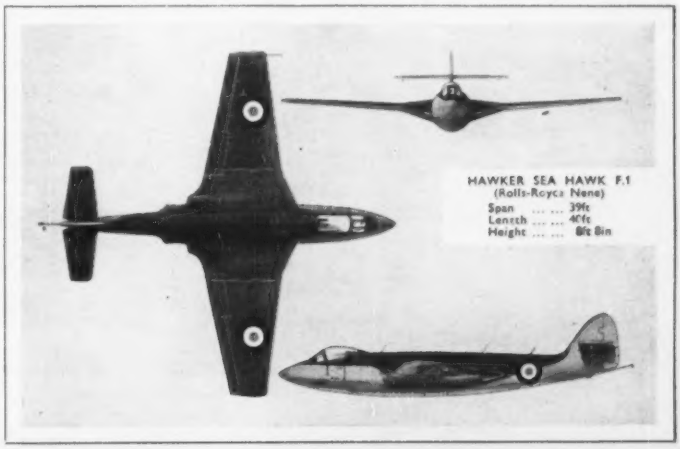
Air Force Equipment. Some Lockheed T-33 tandem-seat jet trainers have arrived in Holland for the use of the Dutch Air Force. For the first time six Republic F-84G Thunderjets for the same Service have been ferried from America. They were flown by way of Greenland by U.S.A.F. pilots. It is expected that Fairey Fireflies on the Dutch carrier *Karel Doorman* will be replaced in the near future by Grumman Avengers supplied under the Mutual Defence Assistance Programme. The Dutch Navy also expects Lockheed Neptunes, Beechcrafts and helicopters—probably S-55s or Piaseckis. Deep interest is being shown in the Fairey Gannet.

Belgium

Four-engined Dakotas. Sabena are reported to be considering the possibility of equipping a number of their Dakotas with two Palas jet-boost units—mainly for use in the Belgian Congo.

Poland and Czechoslovakia

Helicopters. It is reported from Warsaw that the "first Polish-made helicopter" has taken part in a recent ceremonial fly-past. From Czechoslovakia comes the news that "a number of Czechoslovakian helicopters have made their test flights in Czechoslovakia."



HELICOPTER GROUND TESTING

Notable Lectures on Flight-load Simulation

HAD Daedalus, prior to his legendary flight from Crete on wings of wax and feathers, resorted to a little ground testing under simulated flight conditions, he would possibly not have lost his son Icarus and the art of aeronautical engineering might have joined the ranks of the great classics. However, this Greek aircraft designer did not happen to have on this occasion the benefit of a development contract for such test work. Indeed, the whole venture was undertaken strictly without the authority of the local Ministry of Aviation, and so the chances for a successful completion of this noteworthy effort were somewhat restricted. The designer then, very wisely and no doubt realizing the shortcomings of the situation, advised strict adherence to a very limited flight envelope, so that there would be a safety margin for contingencies during the ensuing flight. Such philosophy, however, did not appeal to the adventurous and optimistic mind of the youthful son who threw the father's warnings to the winds, and climbed beyond the prescribed limits into the lofty heights and the sunlight. In those days, apparently, little was known about the behaviour of wax in stratospheric conditions, or else the wax used did not come up to specification standard. Whatever the cause, the wing on coming close to the sun disintegrated and Icarus met his fate. Thus goes the story of the first recorded aircraft accident; one which, incidentally, could have been avoided by sensible ground testing.

The foregoing illuminating reference formed the introduction to the second of the two papers presented before the Helicopter Association of Great Britain on Friday, December 5th, at the Royal Aeronautical Society. In the chair was G. S. Hislop, Ph.D., B.Sc., A.R.T.C., M.I.Mech.E., A.F.R.Ae.S., of B.E.A. Digests of the two papers follow.

MR. BRENNAN'S PAPER

THE first paper, *Introduction to Discussion on the Simulation of Helicopter Flight Loads by Ground Tests (with special reference to fatigue and wear)* was given by Mr. M. J. Brennan, B.Sc., A.M.I. Mech.E., A.F.R.Ae.S., chief designer, Saunders-Roe, Ltd., and was based on that company's work on the Skeeter.

In many respects, began the lecturer, the helicopter resembled an aircraft engine unit and, indeed, the helicopter testing method

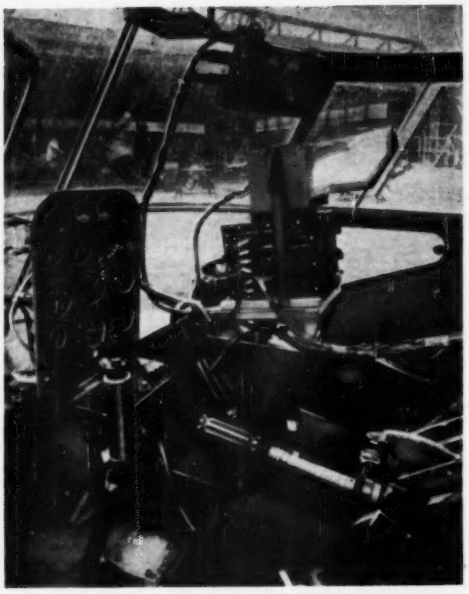


Fig. 1. Layout of test equipment in the cockpit of the Skeeter (referred to in Mr. Brennan's paper).

proposed in 1951 was similar to that of routine engine-testing. The method specified that:—

(1) The first prototype should be tested for functioning on the ground, followed by the strain-gauging of its transmission, control and rotor systems over a complete range of flight control.

(2) Test records should be examined for any undue stress-levels and oscillations.

(3) Assuming compliance with requirements, the aircraft should be run for 50 hours on the ground and then stripped and closely examined for fatigue and wear, using standard engine practice.

(4) Assuming this last test is passed satisfactorily, a second identical prototype should be allowed in the air for (*a*) brief handling trials followed by (*b*) a repeat survey of strain-gauge records in the air.

(5) These records should be examined and compared with those obtained during the ground tests. If it was found that the two sets of records differed considerably, further ground tests should be carried out during which periodic stick-movements and the erection of barriers beneath the rotors were to be introduced, in order to reproduce the same stress and fluctuations as were obtained in the air.

(6) Assuming that this could be achieved, the complete helicopter

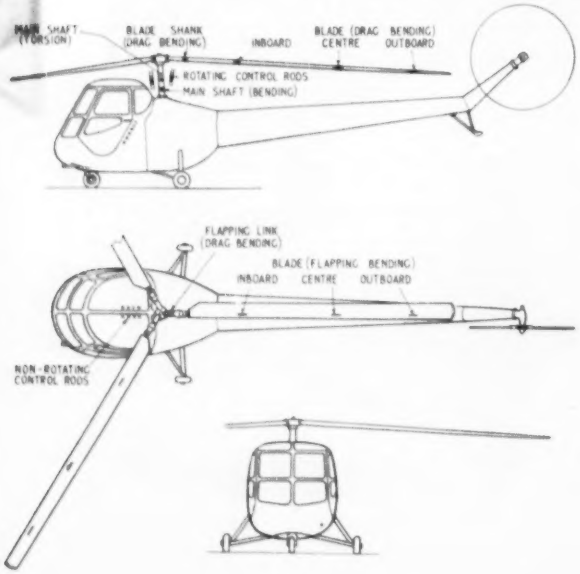
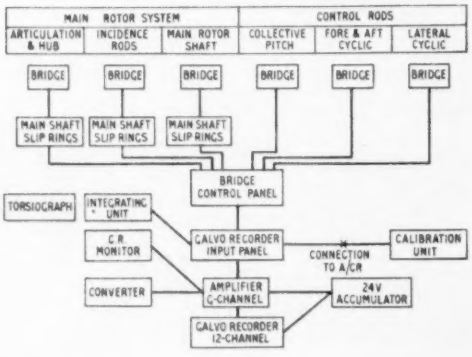


Fig. 2. (left) The position of the strain-gauge bridges on the Skeeter. Those on the rotor hub are omitted for clarity.

Fig. 3. Block diagram of the strain-gauge recorder system used.



should be subjected to an extensive fatigue run on the ground of some 360 hours, during which time the air loads and fluctuations would be simulated. A similar type of programme to this, said the lecturer, had been completed on the Skeeter.

Mr. Brennan then gave details of the test equipment used. To measure the loads, complete strain-gauge bridges had been used, feeding signals through slip rings to a galvanometer for visual readings of steady strains, and to a galvanometer recording unit for fluctuating strains. The flight conditions were measured by the normal flight instruments plus a direct-reading damped accelerometer.

The blade spars were strain-gauged to measure flapping and drag-plane bending moments on three positions along the blade (Fig. 2), and the hub gauges were so placed as to measure the actual strains at the most critical points on the hub forging (previously determined from an R.A.E. brittle-lacquer test). The articulation bridges were positioned to measure drag-plane bending on the flapping link close to the flapping hinge, being mounted on each of the three flapping links and at the shanks of each blade. Two sets of bridges were provided on the main shaft, one to measure torsion and the other bending. The loads in the control system were measured as direct loads in six of the rods.

The number of slip rings limited to three the number of strain-gauge bridges that could be used on the rotating system at any one time. The complete series of flight and ground tests was repeated for five sets of connections, typical readings from these tests being shown in Fig. 5. During take-off and running, only fluctuating stress records were taken.

Since space limitations in the cabin prevented the flight observer from writing down the results, these were transmitted over the aircraft radio to an observer on the ground, and were recorded. A total of 311 recordings were made, including calibrations. The qualitative examination of the fluctuating results had been carried out only briefly, but the following trends had been established.

The first rotor order occurred in most of the records in varying degree. On the main shaft in bending it was the main signal, whereas in torsion it was generally of low amplitude, smaller even than that due to the third order. The first-order amplitude was sometimes large in the articulation and on the blades in flapping, but in the drag plane it was small on the blades compared with the third-order amplitude. In cases where the first rotor order was predominant, it was generally the same on the ground as in flight. A third rotor order frequency occurred in the transmission and articulation in flight throughout the steady flight range. This frequency, however, was only present during ground running when high power was used. A third-order frequency was present on the blades in drag, during ground runs as well as in flight, the amplitudes being usually greater in the latter case.

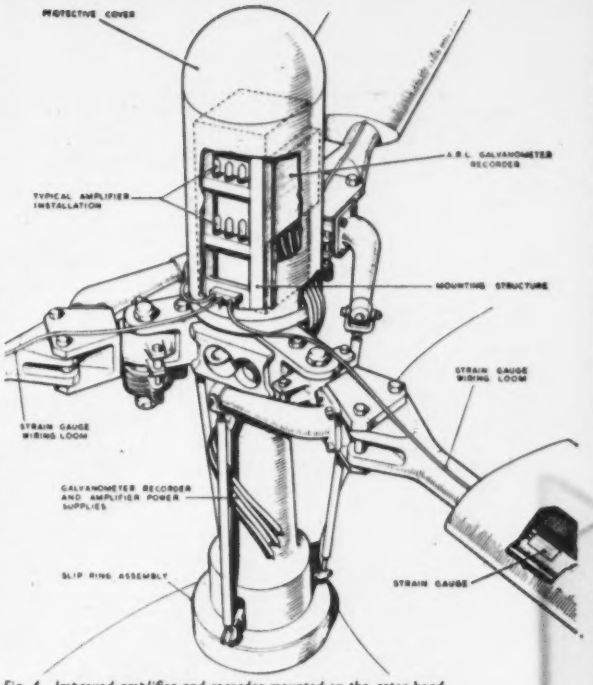
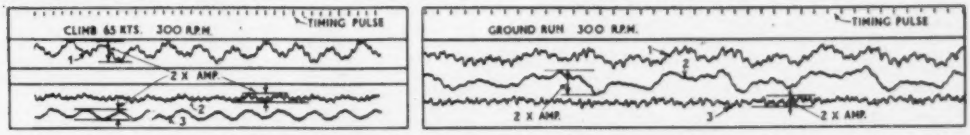


Fig. 4. Improved amplifier and recorder mounted on the rotor head.

Fig. 5. Typical records of fluctuating loads on the Skeeter blades: (1) inboard (2) centre and (3) outboard



Engine vibrations, in particular second engine order and fourth engine order, passed through the transmission and into the blades in the drag plane. In most cases, engine vibration amplitudes were greater on the ground than in the air for similar engine condition.

It was concluded that the tests had been sufficiently complete to show the level of both steady and fluctuating loads occurring on the rotor and transmission of the machine both in flight and during ground running. However, in the case of the blades, it appeared that a further programme of research was required. The method of setting used—that in which the loads were split into mean and fluctuating loads with distinct methods of recording—ensured greater accuracy than the more usual way of recording these two quantities together. It was found that, for the majority of components used, the maximum steady load was greater in flight than on the ground, but that the maximum fluctuating loads were experienced on the ground. The engine vibrations, which caused the start of fatigue failure and were of high frequency, were larger on the ground than in the air. It was thus seen that, in practically all cases, the ground tests covered the flight cases for oscillating stresses, although the steady levels of stresses in the case of flight were higher. As the firm contended that the oscillating stresses were the predominating factor in the fatigue running, then, for the Skeeter, the ground running covered the flight envelope.

Mr. Brennan then described the further endurance running which had continued, no serious defect having been found in over 200 hours' ground running. He presented photographs showing examples of minor defects which had occurred. It had become apparent that present instrumentation techniques were inappropriate and difficult for helicopter use, and amplifying and recording equipment to be mounted on top of the rotor hub was being developed. This would reduce the trouble at present experienced from slip-ring use in low-level signal circuits.

In conclusion, the lecturer stated that it had initially been the intention to carry out extensive strain-gauge measurements in flight and on the ground, and to develop methods of simulating flight conditions on the ground by means of periodic stick movements or by barriers beneath the rotors. It had been found, however, on the Skeeter, that normal fatigue running on the ground covered the flight condition, and so no special simulation of these flight conditions had been necessary.

MR. HAFNER'S PAPER

THE second speaker, Mr. Raoul Hafner (chief designer, Helicopter Department, Bristol Aeroplane Co.) had widened his subject to *The Simulation of Operating Conditions of Helicopters in*

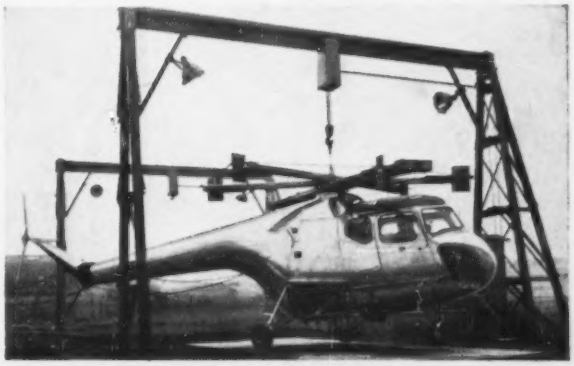
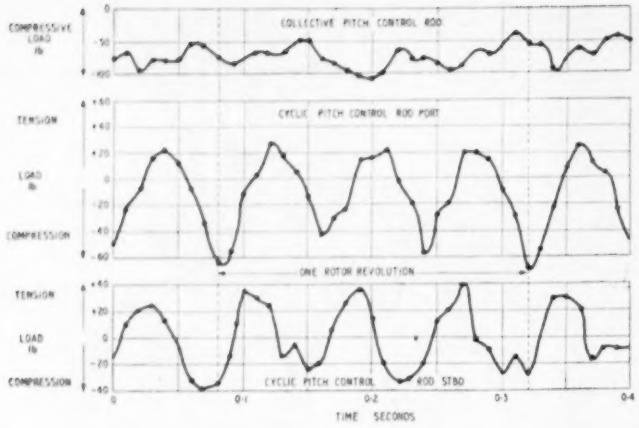


Fig. 6. Test specimen of the Bristol 171 suspended below the gantry. The rotor is replaced by a large fan with adjustable drag plates.



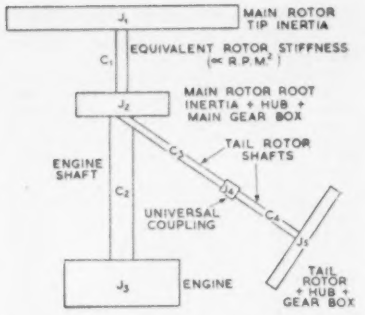

MAIN ROTOR TIP INERTIA
EQUIVALENT ROTOR STIFFNESS (∝ R.P.M.²)
MAIN ROTOR ROOT INERTIA + HUB + MAIN GEAR BOX
TAIL ROTOR SHAFTS
ENGINE SHAFT
UNIVERSAL COUPLING
ENGINE
TAIL ROTOR + HUB + GEAR BOX

Fig. 7. (Left) Strain-gauging of control rods on the Bristol 171, at 250 r.p.m., 90 knots I.A.S. Fig. 8. (above) Diagrammatic scheme of the 171 transmission layout.

HELICOPTER GROUND TESTING . . .

Ground Tests in order to deal with factors other than stresses and forces. After opening with the brief historical reference quoted earlier, he went on to define the purpose of ground testing.

The helicopter designer, because of the possible serious consequences of the wrong answer to his problems, would not usually accept theoretical considerations and calculations as sufficient evidence of airworthiness. Whilst he would find it convenient to use the theoretical approach for the purpose of exposition of the problems and for their *qualitative* solutions, he would follow this up by testing and similar treatment in order to obtain reliable *quantitative* results. Moreover, the empirical approach often disclosed phenomena which previously had not been suspected, and sometimes was the sole approach in complicated cases. The essence of testing lay in making doubly sure that the design was satisfactory in all material aspects before it was released for production and general use.

An important feature of ground testing was the simulation of operating conditions. The most complete simulation was obtained if a whole helicopter were subjected to all conditions of operation in general use, but such a test was neither economically practical nor technically necessary. In general, only critical components and critical conditions needed to be selected for testing: in other words, only partial simulation was required. Examples of such partial simulations were the ground testing of a rotor assembly for all important conditions of flight, that of a blade link or tie rod for conditions of stress with emphasis on fatigue, and that of a gear box for deformation, oil circulation or heat dissipation.

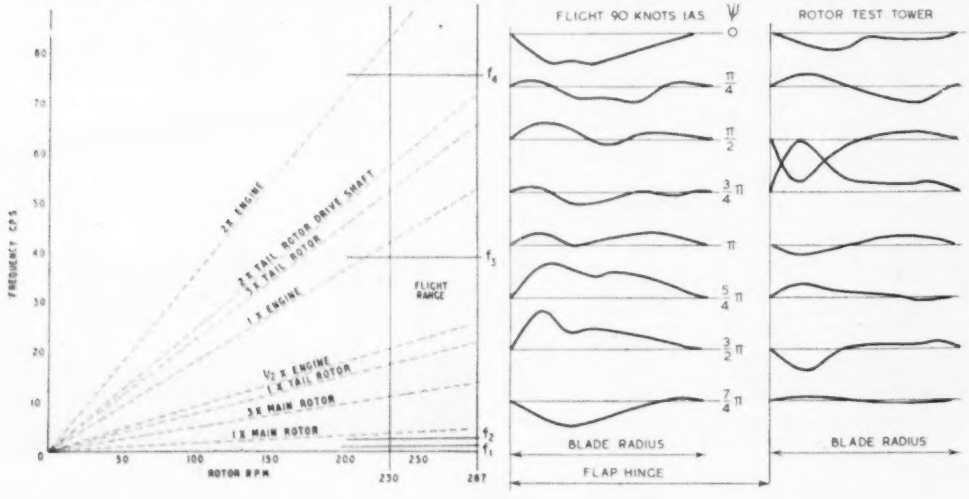
Simulation involved two distinct actions. Firstly, there was the act of determining all elements and factors essential to the simulation and assessing their magnitude, either by calculation or from test flight results. The second act comprised the copying of these features with a test specimen together with appropriate substitutes in a ground rig.

The simulation could not be perfect, but it was generally possible to recognise whether an error was on the conservative or the optimistic side of perfection. Thus it was possible to incorporate more severe conditions in the ground tests than those experienced on test flights so that the tests' conclusions would be "on the safe side," as was frequently done in the pioneering stages of new engineering field. The problem of simulation was particularly involved in the case of tests for establishing fatigue life. It was obvious that the fluctuating stress in a component, whilst perhaps generally conforming to a given pattern, was subject to random variations. The thing that mattered was the *cumulative* damage caused by a long period of flying under the various conditions, and so the problem of fatigue was the simulation of the *cumulative* effect. There was, as yet, no generally accepted theory on fatigue; thus simulation of cumulative damage in fatigue testing was to a great extent a matter of individual opinion, agreement or arbitration.

Three typical examples of partial simulation in ground tests were then described by the lecturer; endurance tests on main rotor controls, on power plant and transmission, and on the main rotor.

Main Rotor Controls.—These controls formed a complex dynamic system which showed a manifold response to extraneous forces,

Fig. 9. Natural frequencies of the 171 transmission system and the extraneous cyclic forces from the engine and rotors which together can cause resonance. Fig. 10. Variation of blade bending moment with azimuth angle (left) in flight at 90 knots I.A.S. and (right) on the rotor tower.



The Royal Air Force have adopted . . .

Pembrokes for communications . . .

Pembrokes for freighting . . .

Pembrokes for long range ferrying . . .

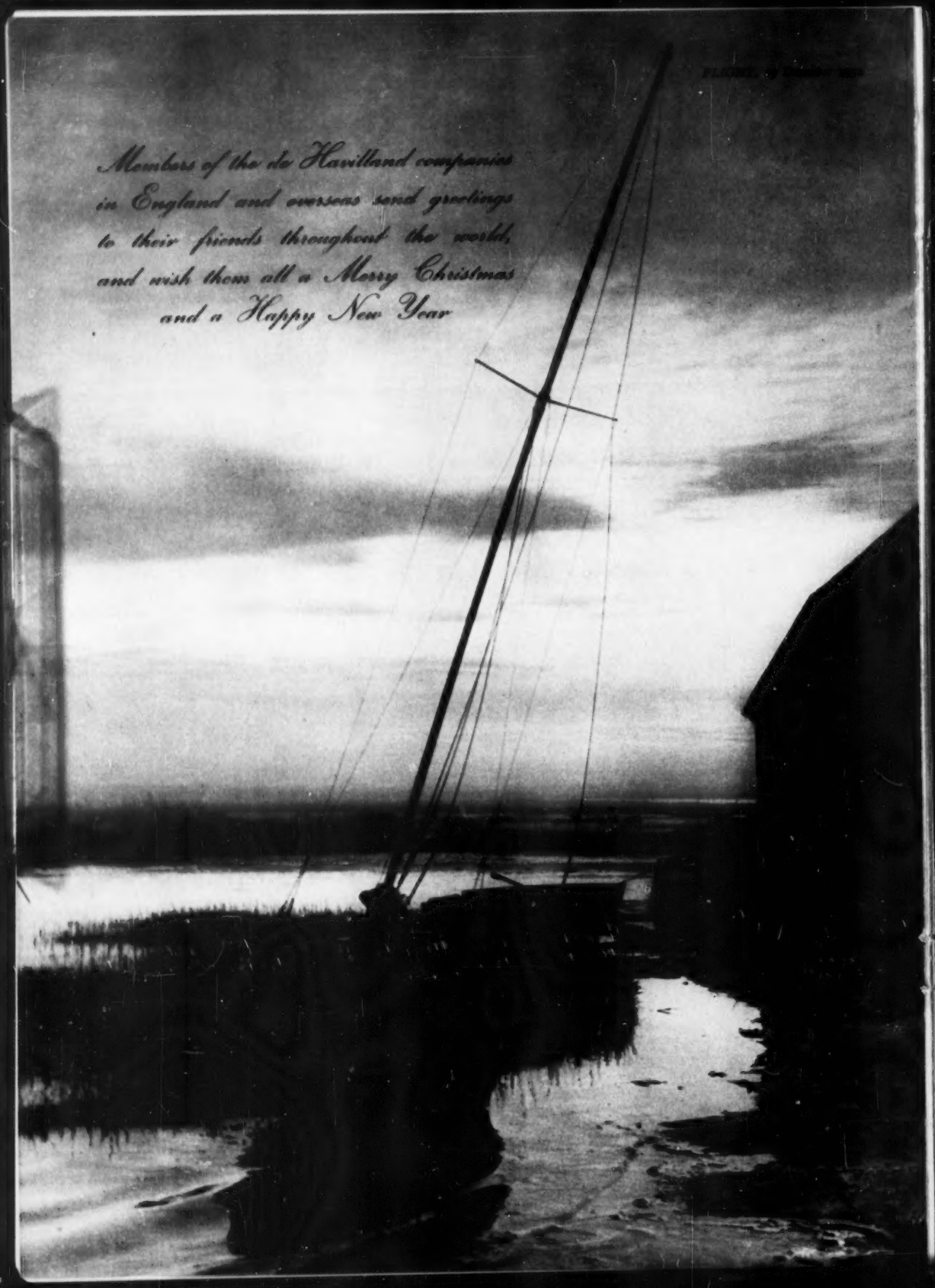
Pembrokes for casualty transport . . .

THE

"Pembroke"

The R.A.F. version of the Percival *"Prince"*

PERCIVAL AIRCRAFT LIMITED
A Hunting Group Company
LUTON, BEDFORDSHIRE, ENGLAND and at TORONTO, CANADA


Members of the de Havilland companies
in England and overseas send greetings
to their friends throughout the world,
and wish them all a Merry Christmas
and a Happy New Year

HELICOPTER GROUND TESTING . . .

As the system in normal use was excited only from the rotor head, it was profitable to fit an exciter to this end of the controls and to study from suitably placed recorders the dynamic behaviour of the system under various frequencies and amplitudes of excitation. Also considered should be the effect of possible errors in the manufacture of the rotor blades or their adjustments on the magnitude of control excitation.

For the flight tests which followed, the prototype aircraft was suitably instrumented and, in particular, strain-gauges were placed in the critical areas of the control system. The flight test schedule was planned to contain the critical conditions discovered in the preliminary investigation; the test results were then analysed (Fig. 7) and an assessment made of the cumulative damage in fatigue and wear due to a given period of typical flying. This then established the datum points for the ground tests.

The control system, complete with strain-gauges and relevant instrumentation was then placed into a ground rig, and loaded by synthetic means in such a way that the cumulative damage in any part of the system from a given period of ground testing was at least as great as that from the same period of typical flying. Endurance tests were then made, and continued where necessary until conclusions could be made concerning the fatigue life of the system and components, and the measure of inspection necessary.

Power and Transmission System.—This system was dynamically very complex, and a theoretical investigation on linear and torsional vibration was generally useful, as it provided information on critical rotor speeds, regions of stress, etc., which required special attention during the ground test. The linear vibrations were concerned mostly with shaft whirling, and most important was the critical whirling speed and the bending movement variation along the shaft. Concerning torsional vibrations, the system could be regarded as a number of masses with interposed elasticities, and capable of swinging in a corresponding number of natural modes and frequencies. At the same time the system was subject to extraneous cyclic forces at various frequencies, coming mainly from the engine and the rotors (see Fig. 9). Resonance would then exist whenever a forcing frequency was at or near that of natural mode of swinging, and very high stresses could be experienced.

The theoretical analysis could, therefore, ensure a judicious placing of strain gauges and other instruments, as well as a sensible flight test programme. The information obtained from such test flying could then be used to assess the cumulative damage caused in a period of typical operation.

On the actual simulation, it was advisable to include the major part of the aircraft structure and to suspend the test specimen below a gantry on a length of cable attached to the rotor hub (Fig. 6). This represented a low-frequency suspension in the plane of rotation with a constant acceleration of one "g" acting on the specimen, corresponding to the condition of rectilinear flight. It was generally necessary to replace the rotor of the helicopter by a large fan with adjustable drag plates, in order to permit a wide variation in rotor torque without interfering with the condition of suspension. The rotor, with reference to the dynamics of rotational movement, was a "two mass" system, with the rotor hub mass articulated to the combined blade mass. The centrifugal force in the blades constituted in effect an elasticity between the two masses, represented dynamically on the fan by a spring coupling.

Critical conditions obtained in flight tests were reproduced in the specimen, and the schedule for ground testing was established, bearing in mind that the cumulative damage from the ground test condition had to be at least as great as that from the air condition.

The Rotor and the Hub.—In the first instance it was necessary to calculate the natural swinging modes of the blade and the corresponding frequencies. Most important besides the fundamental torsional mode were the flexural modes in the vertical plane, the fundamental mode of which was the blade flapping about the flapping pin combined with some in-phase bending of the blade.

In forward flight the aerodynamic lift forces acting on the blade could be resolved into Fourier components, giving a constant mean lift and a range of harmonic terms, and resonance would clearly occur when the natural frequency and the forcing frequencies were the same. A theoretical analysis was needed to show critical regions in the blades as well as critical rotor speeds, in deciding the prototype instrumentation and flight-test programme.

Ground running of the test specimen was conveniently done on a rotor testing tower (Fig. 11), sufficiently high to avoid aerodynamic ground effects. Although means were provided for varying collective pitch as well as rotor speed, the tower did not provide a forward speed component, which produced the harmonic lift terms referred to earlier. Such lift variation could be provided artificially, using either cyclic change of blade incidence or obstruction in the rotor slipstream, and the latter method had been adopted. In spite of difficulties, it was generally possible to produce a fair simulation of cumulative fatigue and wear damage.

These examples represented only a very small part of the ground testing necessary to establish airworthiness of a new helicopter type, which might involve up to 600 tests of various kinds. Every endeavour should, therefore, be made to devise these ground tests in such a way that as many general conclusions as possible could be drawn therefrom for the benefit of later designs. The need for basic type testing of helicopters in ground rigs would always remain.

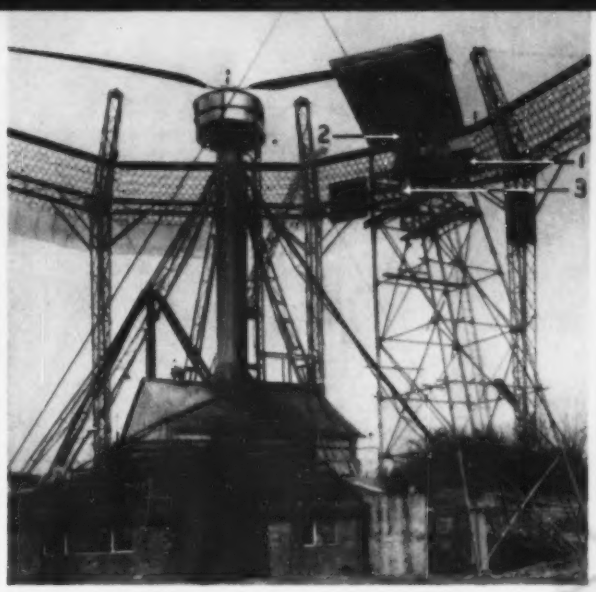


Fig. 11. The Bristol Aeroplane Company's rotor tower, mentioned by Mr. Hafner. Picked-out by numbers are (1) the working platform, (2) the guide wheelcage, and (3) the column. The main obstruction platform was used to simulate the effect of forward speed.

THE DISCUSSION

Mr. W. A. P. Fisher (R.A.E.) opened the discussion which followed the two main lectures, suggesting that fatigue effects would build up more rapidly in a helicopter than in fixed-wing aircraft, and, therefore, should be treated in a different manner. The ground simulation should definitely be of conditions more severe than those in flight, and as the failure of a helicopter was much more serious than that of an engine in a fixed-wing aircraft, the helicopter/power-plant analogy for testing should not be carried too far. Lt.-Col. F. L. Hodgess, R.E.M.E., A.M.I.Mech.E., A.F.R.Ae.S. (Fairey Aviation), described the helicopter's change from a docile animal when free to a fierce beast when tethered, due to increased torsional loads set up by undercarriage oscillation. His company had experienced trouble with slip rings, but mercury pick-ups had helped to reduce the background "hash" transmitted.

Simulation was not difficult—it was impossible, claimed Mr. J. S. Shapiro, Dipl. Ing., A.F.R.Ae.S. As ground simulation could not reproduce the stresses and strains of flight, why go to the expense and trouble of constructing towers and complicated test rigs? Tests could be made simply and safely in actual flight. Mr. K. K. Williams, B.Sc., deputizing for Mr. W. Tye (A.R.B.), emphasized that the cumulative damage caused by fluctuating loads was a very serious problem in helicopters; separate testing standards for military and civil machines was a logical possibility. Dr. H. Roberts, D.I.C., Ph.D., A.F.R.Ae.S., A.M.I.Mech.E., extended the chicken-and-egg question to helicopters—which came first, ground-testing or flight-testing, and what was the design-value of ground simulation?

Mr. Brennan replied first. As the number of reversals in helicopter blades was known, he said, the safety factor was higher than for fixed-wing aircraft. Ground simulation was worth while, as the flight loads reproduced were used as datum points only, from which the loads in other parts could be studied. The air-ground transference of records had been a question of compromise, and the initial strain-gauge stress measurements were quite separate from the later calibrations.

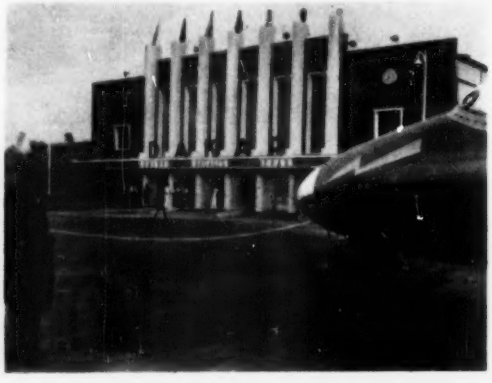
Mr. Hafner agreed with Mr. Fisher that helicopter failure would have serious results, but the safety factor on the ground tests should not be extreme. The introduction of new modes of vibration due to the undercarriage had, in fact, led to the use of the rotor tower. The safe flight tests described by Mr. Shapiro might be different from the high-speed flight conditions under investigation, for simulation was not merely optical. Introducing a new helicopter was like wearing a new pair of shoes, the aim of ground-testing being to find out where the pain was. "To conclude," Mr. Hafner remarked, "we really don't know enough about fatigue."

LATIN-AMERICAN TOUR

Canberras of No. 12 Squadron Return to their Binbrook Base

Two Canberras are seen parked at Caracas, Venezuela, under the guard of the Venezuelan Army. The photograph was taken beneath Hastings WJ337.

On the left Sgt. A. B. Fraser, F/O. M. G. Jones and F/L. G. Stephenson are seen disembarking at St. Eval upon their return to the United Kingdom. The larger photograph shows an individual Canberra thrilling crowds at Kingston, Jamaica; the lower two illustrate a Canberra in company with a Martin 2-O-2 of Linea Aeropostal Venezolana, and, on the right, A.V-M. Boyle's aircraft parked at Dakar, French West Africa.



848 SQUADRON WORKS UP

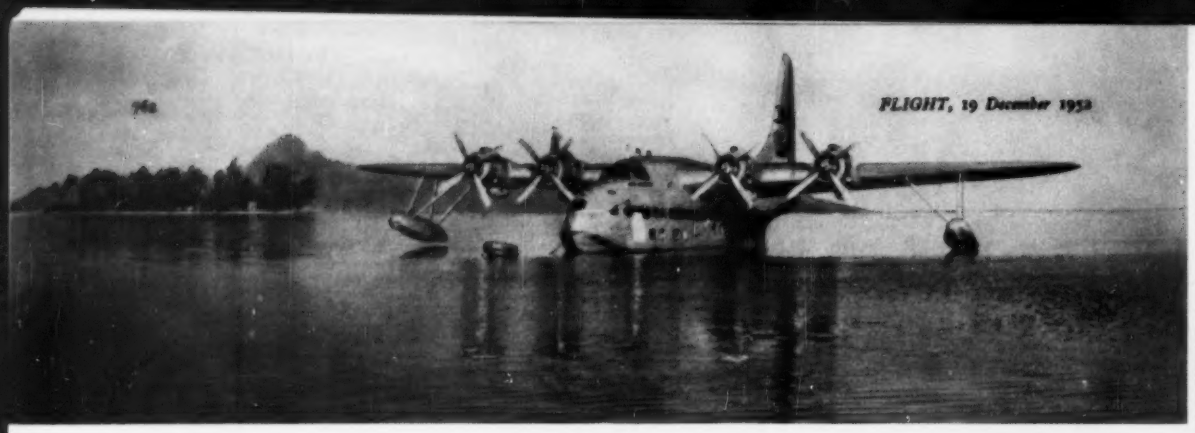
Flying Personnel of the Navy's First Operational Helicopter Unit, who Recently Embarked for Malaya

Commanding officer of No. 848 Sqn. is Lt. Cdr. S. H. Suthers; he was the helicopter pilot who attempted the rescue of Capt. Carlsen and Mr. Dancy from the "Flying Enterprise".

Non-commissioned aircrew for observer duties: C.P.O.s G. Willas, J. Hayball, M. Dwane and A. Janman.

It was misty weather when a "Flight" photographer visited H.M.S. "Siskin," Gosport, as this view of ground man-handling shows.

As recorded on page 746 of this issue, the S-55s of No. 848 Sqn. were not originally due for delivery to the Royal Navy until 1953. Allocated under the M.D.A. programme, one is here seen at its Gosport base with some of the squadron pilots. Left to right: Lt. Cdr. S. H. Suthers, Lts. J. E. Breese, John Walden, A. Taylor, R. Taylor, A. R. D. Hawkes, and Lt. Cdr. D. Luff.



CORAL ROUTE

WITH the exception of their Christchurch-Melbourne service, flown by Skymasters, the entire route-network of Tasman Empire Airways is operated by five Short Solent flying-boats. For some time these splendid marine aircraft have provided luxurious travel between Sydney and Auckland and Wellington (incidentally, New Zealand's faith in flying-boats was demonstrated recently by the opening of a £20,000 marine-aircraft passenger terminal at Evans Bay, Wellington). The Solents also operate island services eastward across the Pacific, of which the most recent is the aptly named Coral Route, from Auckland to Tahiti by way of Fiji, Samoa and Aitutaki. As these illustrations show, this fortnightly service follows a route with stopping places worthy of that usually overworked word "romantic."

Pictured above is the harbour at Papeete, Tahiti, with Borea island visible in the background. The other views show the small coral-island refuelling stop at Aitutaki, in the Cook Group; TEAL have built on this island, Akaiami, some native huts in true tropical surroundings. Passengers and crew can enjoy ideal swimming from the sandy beach (below) during the two-hour break in their journey. The Coral Route has proved very popular with American tourists (who fly from San Francisco to Fiji by landplane in order to pick up the Solent service), and the frequency may be doubled next year.

Designed for high speed jet aircraft the Martin-Baker Patent Ejection Seat is fitted to this—the world's first Delta Wing Bomber

Martin-Baker
AIRCRAFT COMPANY LTD.

HIGHER DENHAM · NEAR UXBRIDGE · MIDDLESEX

"Never Without a Handley Page"

Never has the Royal Air Force been without big Handley Page aircraft in service. We created the world's first successful heavy bomber in 1915 and during the past four decades have contributed largely to Britain's power in the air.

HANDLEY PAGE

RADLETT LONDON READING

(Left) F/L. Ross receives the McKenna Trophy from Professor Hall, while "Headmaster" G/C. Clouston looks benevolently on; seated at the left is A. Cdre. A. H. Wheeler, O.C. Boscombe Down. (Right) The McKenna runner-up was Lt. W. Noble, R.N. Dimly seen (extreme right) is Mr. S. Scott-Hall, Director-General of Technical Development (Air), M.o.S.

THE McKENNA TROPHY DINNER

THE passing-out of No. 11 Course at the Empire Test Pilots' School, Farnborough, was marked on Friday, December 5th, by the traditional dinner and the presentation of the McKenna Trophy to the best all-round student. Dinner over, the famous "headmaster's titfer" was becomingly placed upon the head of the Commandant—G/C. A. E. Clouston—who thereupon rose to address the assembly.

He regretted the absence, due to illness, of Air Marshal Sir John Boothman, and thanked Professor A. A. Hall, Director of the Royal Aircraft Establishment, for stepping into the breach. With 33 students the course had been the largest ever. Of this number two had lost their lives—through no fault of their own—and the group captain paid tribute to them.

The quality of the students on the course, he unhesitatingly announced, had been higher than ever before, and there had been no infractions of flying discipline. A burst of applause followed his reference to two highly creditable forced landings pulled off by F/O. T. P. Frost. One of these—on the airfield itself—followed engine failure in a Vampire at 40,000ft.

Three years ago, the group captain went on, the course put in nearly 3,000 hours' flying, last year nearly 4,000, and this year nearly 5,500—this with the same number of aircraft and ground crew. A "wonderful job" had thus been accomplished by Cdr. (E) K. R. Hickson, R.N., the chief test-flying instructor. Every minute of every day had been planned; staggered lunch hours allowed flying to continue uninterrupted.

Group Captain Clouston referred to the elderly types of aircraft with which the School is equipped, remarking that their inherent faults were very good for training; more modern types were, however, needed. The next course would be flying the Canberra and (the group captain added with a twinkling eye) "later-mark Vampires." No other flying unit in the Service took its machines to their limits as consistently as did the E.T.P.S. and the Commandant wanted the aircraft changed as often as possible. Thanks to G/C. W. K. Stewart, Officer Commanding and Director of Research at the Institute of Aviation Medicine, all the students had been through the high-altitude chamber, "whether they liked it or not," and the Institute's Spitfire had been made available for training with the g suit.

The Commandant named the McKenna Trophy winner as F/L. R. J. Ross, R.A.F., who earned 88.1 per cent marks. Runner-up was Lt. W. Noble, R.N., with 82.5 per cent, and third Lt. W. S. Stewart, U.S. Navy, with 79.2 per cent. There was no lack of sincerity in the group captain's concluding remark that the course had been the "best yet."

Describing himself as a "professor boffin type," Professor Hall paid a personal tribute to the pilots on the course and to test pilots in general. By their "ability, devotion to duty and gallantry" they assisted greatly in bringing forward the future of British aviation.

Having received the McKenna Trophy, F/L. Ross was called upon to speak, and very ably he did it; amusingly, too, as when he referred (probably with the runner-up in mind) to "a lot of salt water" that had been mixed with the course. He confessed that he was gravely disturbed that his American colleagues, having flown Lincolns and Meteors, would take back with them experience which would "give the States a bit of a lead." These same officers, he said, had shown great interest in our ancient monuments. (He apologized for bringing the Lincoln up again.)

Speaking later about the departing members of the staff—Mr. P. L. Bisgood, S/L. E. L. Drake, S/L. R. F. W. Cleaver and S/L. F. E. Clark—the Commandant disclosed that "Bis," who had served the School as Chief Technical Officer, had been authorized by Sir John Boothman to fly the School's aircraft and that he had succeeded in going solo on a Meteor.

Of the many subsequent speakers we must not fail to name Major J. F. Cotton, U.S.A.F., who took the occasion to present the mess with two vast and magnificently framed photographs of the B-47 and B-52. He regretted his inability to quote the dimensions of the B-52, but he understood that its gust alleviator had a gust alleviator! There followed a veritable epidemic of aircraft-photograph presentations and we believe the next course will be casting yearning glances at splendid studies of the Valiant and Javelin.

THE C.A.S. AT LONDON U.A.S. DINNER

ALTHOUGH allegedly emulating Mark Twain in "not feeling so good himself," W/C. A. W. Heward, O.B.E., D.F.C., A.F.C. (Commanding Officer, London University Air Squadron), gave a witty and impressive opening speech at the squadron's seventh annual dinner, held at the Park Lane Hotel, London, on Wednesday, December 3rd. In proposing the health of the guests, W/C. Heward first referred to the presence of the Chief of the Air Staff, whose attendance was a great honour for the squadron.

He then thanked the R.A.F. for the Squadron's aircraft and equipment (and red tape!), the University for its men, and individual guests for their particular services. In the past year, 6,239 hours had been flown—the highest total for any U.A.S., and thanks were due in a large measure to W/C. Rogers, his predecessor. The recent success of the recruiting campaign for women fighter-controllers had been gratifying, as had the success of the summer camp at H.M.S. *Siskin*, Gosport. It had been, concluded W/C. Heward, a year of solid achievement.

In reply, Air Marshal Sir Ronald Ivelaw-Chapman, K.B.E., C.B., D.F.C., A.F.C. (Deputy Chief of the Air Staff), referred to the return of the C.A.S. from his successful United States tour. The success of a University Air Squadron was not measured by its value in war alone, but by the extent to which an interest in aviation was continuously fostered in the University.

Lt.-Col. F. E. A. Manning, M.C., T.D., B.Sc. (University of London Military Education Committee), then proposed the toast of "The Squadron," his detailed knowledge of which surprised

THE C.A.S. AT LONDON U.A.S. DINNER . . .

not a few of the cadets present. A sense of pride in the squadron was justified, Col. Manning claimed, although statistics could not reveal everything. Nineteen of the University's schools and colleges were represented in the squadron, which was a very good thing.

Replying on behalf of the squadron, F/O. W. H. Walter (Royal Veterinary College) mentioned the creditable standard of the rather large number of instructors who had passed through their hands that year. A popular photographic story was then recounted in the context of the summer camp, and the complaint voiced that although the squadron now had women controllers, it still had no Harvard.

An unexpected speaker was the Chief of the Air Staff, Marshal of the Royal Air Force Sir John Slessor, G.C.B., K.C.B., D.S.O., M.C. He said that to be able to be back from Washington in time for the dinner had come as a pleasant surprise to him, and the mention of Gosport had recalled his own first cross-country flight, from there to Farnborough some 37 years ago; difficulty was on that occasion experienced in gaining sufficient altitude to cross the Hog's Back !

In serious vein, the University squadrons were of immense value in spreading an appreciation of the importance of air power. What the Navy League had achieved in increasing the naval dreadnought strength in the past, a well-informed group could achieve for air power now. And air power did not mean fighters only : if Britain ever made the mistake of dispensing with bombers, she would become a third-class power. The bomber force had replaced the battle fleet as a major factor in influencing the country's world position.

Following the dinner, an inscribed silver flask was presented to W/C. A. V. Rogers, A.F.C. (late C.O. of the squadron) by F/O. Walter, on behalf of the squadron, at their Kensington headquarters.

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns; the names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

The Bristol Fighter

IT is really most encouraging to see the kind words from readers about my D.H.4 and Bristol Fighter articles. I only hope I shall be able to maintain the standard in future articles. I feel, however, I must say something in reply to Mr. P. H. T. Green [November 28th].

The type-numbers of the several versions of the Bristol Fighter were deliberately omitted from the article, for their inclusion would have been an anachronism in the essentially "World War I" atmosphere. The Brisfit was not known as the Bristol Type 12 F.2A, or Type 14 (etc.) F.2B when it was built nor during its most glorious period of service. Type numbers for Bristol aircraft were not introduced until 1923-4, when Capt. Barnwell allotted numbers retrospectively to all designs from the Bristol Scout onwards. This explains why no type numbers were given to the Coanda monoplanes and biplanes, the Gordon England machines, and other pre-war types. The first Bristol machine to appear with its type number properly allotted was the Type 90 Berkeley.

It is therefore absolutely correct to speak of the Type 96 F.2B Mk III, but rather less correct to speak of, for example, the Type 14 F.2B.

Finally, to settle somewhat irrelevantly on a point in Mr. M. J. F. Bowyer's most valuable letter, I believe that No. 77 Squadron had some B.E.12B machines at one time. This was more or less a B.E.12 with a 180 h.p. Hispano-Suiza engine, but it is, alas, another of those elusive types of which no photographs seem to exist.

Birmingham, 32 J. M. BRUCE.

[These remarks on type numbers bear out the letter from "Senrab" of Bristol, which, received before Mr. Bruce's letter arrived, we published last week.—Ed.]

THE remarkably complete history of the Bristol Fighter contained in your issue of November 7th will excite special interest amongst those of your readers who were fortunate enough to have handled the "Brisfit" during the Kaiser War. Under "Facts and Figures" it is remarked that these aircraft were used at the Air Observers Schools at Hythe, New Romney, Manston and Eastchurch. Actually, there was no airfield at Hythe, but only the Imperial Hotel, which housed (in great comfort) the commissioned air and ground instructors and the officer cadets who had graduated from the Observers Schools of Aeronautics. On the golf course within the grounds of the hotel the cadets mastered the intricacies of the Lewis gun.

The next stage of their training was at Dymchurch, where an airfield then existed adjacent to the Redoubt, in which lunch was served on flying days. The initial air training was carried out on Armstrong-Whitworth "Ninety" and Avro 504K aircraft, fitted with Hythe camera-guns.

On completing the course at Dymchurch, the cadets left the Imperial Hotel and moved into quarters at New Romney, where they flew on Bristol Fighters fitted with Lewis guns, and used live ammunition, firing into targets anchored in the sea.

The aircraft were standard operational Bristol F.2Bs, and amongst the pilots (in mid-1918), were Messrs. Lindup, M.C., Hince and Purdin, the last-named being destined to carry out many years of experimental flying at the R.A.E. Practically all the pilots at New Romney were undergoing a "rest cure" after periods of service in France, or for some other reason which rendered them temporarily unfit for combat duties.

Ryde, Isle of Wight. FRANCIS A. KAPPEY.

Atlantic Pathfinders

STATEMENTS have been made, notably by Sir Miles Thomas, that we know little about upper-air conditions over the North Atlantic, and that these will have to be investigated before regular airline services with Comets can begin.

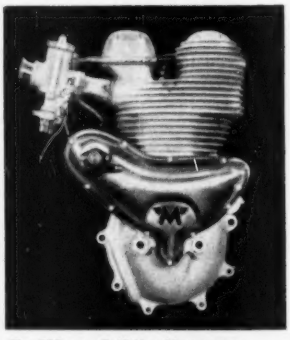
Canberra production must now be on a scale such that the R.A.F. could spare three or four of these aircraft to enable this exploration to begin immediately. I realize that the required knowledge may best be found by use of the aircraft type which will use it, and that flights to obtain the necessary data might be used also for crew training; but the Canberra has similar engines and can be operated at similar heights and speed, while provision of wing-tip and bomb-bay fuel tanks should give ample range. With aircraft based on, say, Northern Ireland, Newfoundland and Bermuda, suitably equipped, much could be learned of the upper-air winds which might assist earlier introduction of the Comet over the North Atlantic routes. Such flights might even be carried out by the Royal Air Force, as an integral part of training.

Cambridge. PEDANTICA.

"Ultra-light" Possibilities

IN your issue of November 21st your correspondent Col. C. E. Bowden provided details of the power output developed by modern multi-cylinder motor-cycle engines, and referred to their suitability for employment in light aircraft.

It may be of interest to your readers to know that a variant of the A.J.S. twin-cylinder engine to which he referred, and as fitted to our new Model G45 Matchless racing motor cycle, develops in excess of 48 b.h.p. without any addition to the overall weight. The prototype engine was successful in winning the Senior Manx Grand Prix in the Isle of Man during September at the record speed of 88.63 m.p.h.



The 500 c.c. G.45 Matchless engine

In case would-be light-aircraft constructors are anxious to obtain engine units of this type, I am obliged to advise that, as our output of complete motor cycles is at present limited by the number of power units we are able to build, our interests must of necessity be restricted to the motor cycle industry.

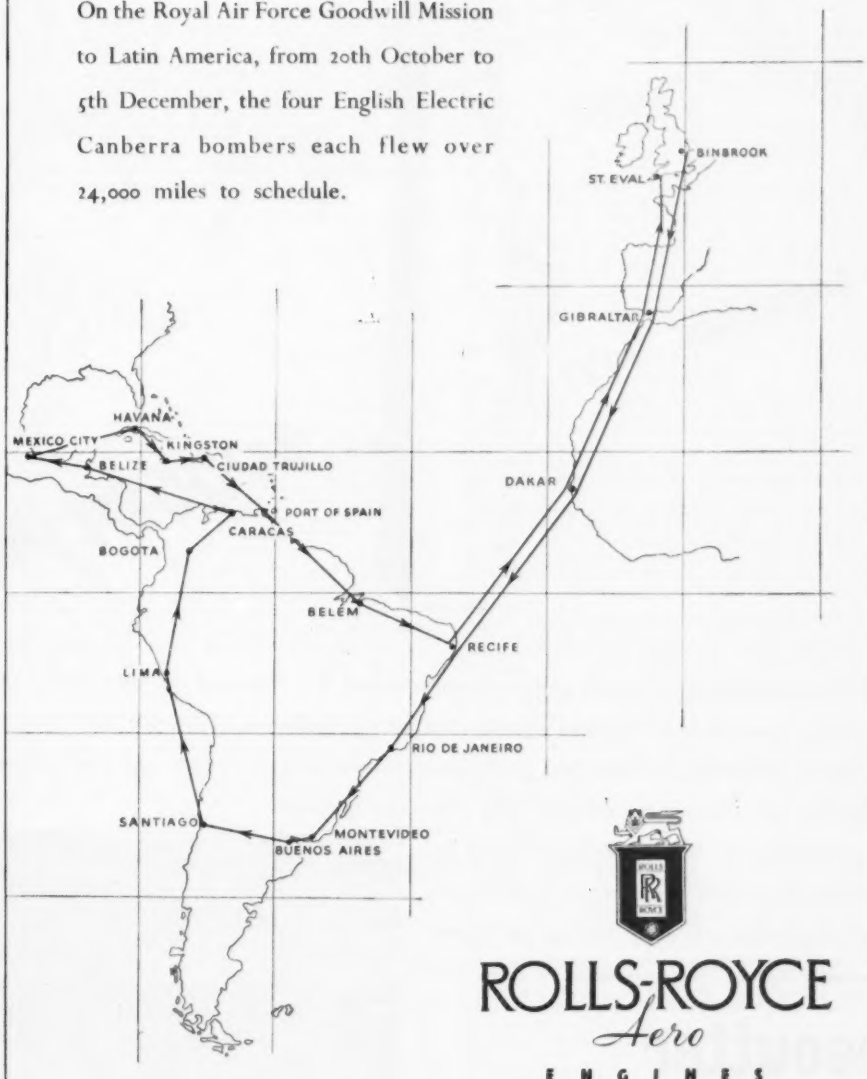
London, S.E.18. ASSOCIATED MOTOR CYCLES, LTD.,
J. M. West, Sales Manager

IT was very interesting to read Col. Bowden's ideas about "dinghies of the air," particularly the suggestion that motor-cycle engines should be made use of, and the conception of an aircraft with what would normally be referred to as a limited performance.

Both these ideas seem to me to be definitely what is wanted, but perhaps we should try to make it clear for whom we are catering.

ACHIEVEMENT

On the Royal Air Force Goodwill Mission to Latin America, from 20th October to 5th December, the four English Electric Canberra bombers each flew over 24,000 miles to schedule.

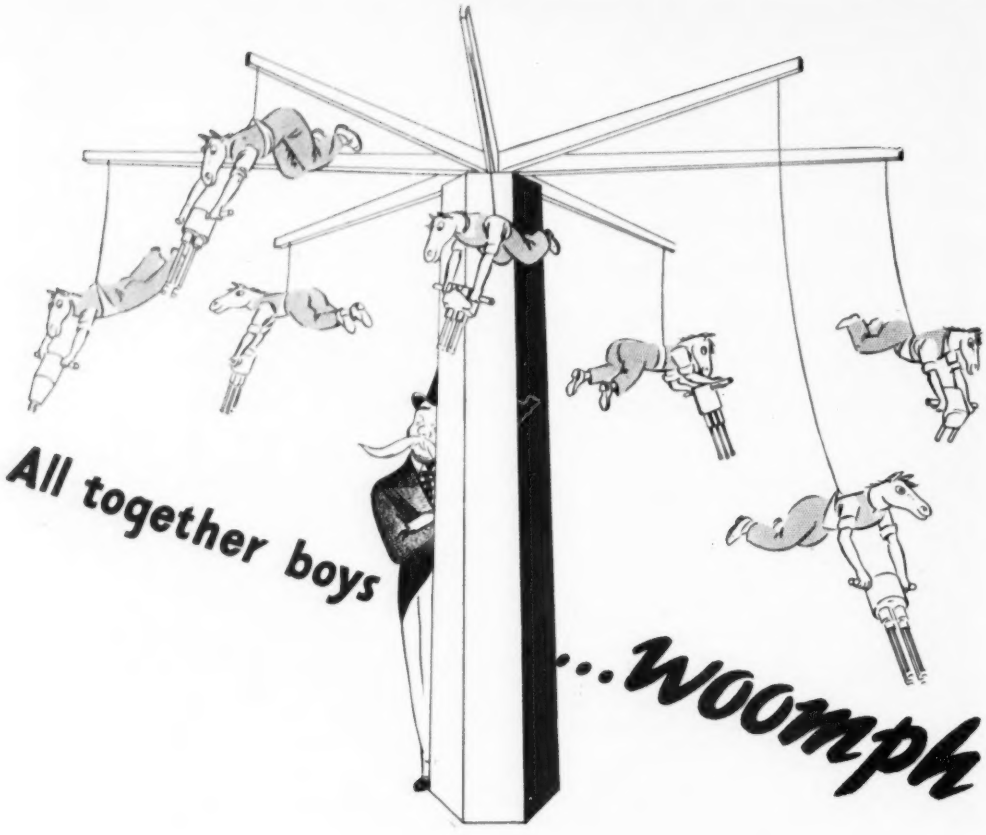


ROLLS-ROYCE

Aero

ENGINES

FOR SPEED AND RELIABILITY



OUR LITTLE HORSES think it's a new and lovely game. Round they swing and one after another they are pulled down, each to do some assembly job on an Austin car. Little Joe will fasten on the engine. Frederick, Sebastian and Montmorency come down as a team and deal with the brake link. The Quads fasten the four wheel nuts in one operation.

All assembly in this new Austin Plant is done by our Little Horses and very proud of them we are. And a nice man with curly hair on the Austin Assembly Line said *he* was proud of them too.

Desoutter

POWER TOOLS INCREASE PRODUCTION

DESOUTTER BROS. LTD., THE HYDE, HENDON, LONDON, N.W.9 TELEPHONE: COLINDALE 6346 (5 LINES) TELEGRAMS: DESPNUCO, HYDE, LONDON CRC237

CORRESPONDENCE . . .

To me the light personal aircraft comes in roughly the same category as the solo motor cycle, which is essentially a pleasure vehicle although used by many for utility as well. The type of mind which enjoys or has enjoyed motor cycling for pleasure would also in most cases find pleasure in private flying—if it were not so expensive. Provided, of course, that there was somewhere to fly to. One must not be restricted by either regulations or pocket to flying round and round the home airfield, or enthusiasm will vanish very rapidly. Having now found quite a large class of people who would like to fly but can't afford it, let's see what could be done for them.

A cheap and reliable engine and airframe are first requirements, and Col. Bowden has shown where we could obtain them. The safe low-speed qualities must be there, and I am inclined, like your correspondent, to treat this as so basic as to need no further reference. As for speed and range, who would not be content to cruise at 65-70 m.p.h. and upwards of 50 m.p.g., and who wants to fly for more than two hours without chance to stretch his legs? But the cost of flying even in such an aircraft would still be very much higher than the cost of running a motor cycle with the same engine in it. The maintenance costs of the two would be out of all proportion, because of the periodic inspection work called for and requiring the signature of a ground engineer.

This work is necessary in the case of larger, faster aircraft and in the case of public transport aircraft, but is it necessary for our little machine with its landing speed of 25-30 m.p.h.? I don't think it is. Consider our potential pilot who owns a motor cycle or a private car. He is allowed to drive it along the narrow strips of the earth's surface which we call roads, in close proximity to thousands of other vehicles, including public transport, travelling in both directions. The outer edges of these strips are fairly seething with humanity hemmed in by the traffic on one side and valuable property on the other. It would seem almost inevitable that mechanical failure, at least on the "airframe" side of his contraption, would entail damage to property or life other than his own, yet so long as he has third-party insurance it is left entirely to him to keep his vehicle in what he considers to be adequate serviceability by whatever means he thinks fit.

Now take the case of his "dinghy of the air." Provided that we keep him away from town centres and main airports, he flies at a safe distance from other private aircraft (and nowhere near public-transport aircraft at all, because they operate above the heights he will use) and at one or two thousand feet, over a countryside where the area occupied by buildings or human beings is infinitesimal compared with the area not so occupied. He is the same man, holding his life in just as great esteem as he did a few minutes ago when driving along the road to the airfield. Why, then, seeing that he is now so much less likely to kill or injure anyone other than himself, can he not be given freedom of operation with "driving licence," tax and third-party insurance in the same manner as before? If it isn't done, flying will never be for more than a very few, because it will always be too expensive.

TANNEFORS, SWEDEN. A. M. CREEDON.

Turbojet Fog Disposal?

FROM time to time (nearly always in November) the problem of fog dispersal receives Press attention such as your "Fido" article (November 28th). As long ago as 1944, Mr. I. Lubbock of combustion fame proposed to me that jet engines might be used. At that time there were no runnable but sub-standard engines available; today there must be quite a number.

Would it not be feasible to put a row of engines on anchored light trolleys *en echelon* down each side of a runway and pointing nearly down-wind? These engines could be quite unattended, set to run at some governed speed, and started by one push button, stopped by another. It is envisaged that they would need to run for, say, a minute and a half per landing. Their heat-release, combined with their jet velocity and turbulence, should make quite a difference to fog. The fuel consumption would, of course, depend on their number and I cannot predict how many would be necessary. A convenient ground-wind would be created.

If they were aimed slightly downwards, their de-icing effect on the runway might also be exploited.

I imagine that an experiment would be made (a) in broad daylight, and (b) in fog, for less total cost than that of one complete turn-round of a passenger liner, providing of course that the engines themselves were borrowed and the arrangement for test were a mere lash-up.

London, N.W.3. PATRICK JOHNSON.

Feasible Flying Saucers

I WAS very pleased to see that someone [Mr. G. Lockington Bates, October 31st] had enough courage to express his views on the flying saucer, and views which are very nearly the same as my own.

Few realize how close to future aviation we were when at school we threw paper darts and "flying carpets," and, in relation to the flying saucer theory, spun cards across the classroom.

A suggestion I should like to make as a modification to Mr. Lockington Bates' idea is that his saucer could be simplified by having, instead of four pitch-adjustable wings, several retractable short stub wings set round the perimeter of the saucer, relying on the amount of retraction for the amount of lift.

Whether it would be better to hold the central cabin still by a jet set off centre is a matter open to discussion.

Reigate, Surrey. K. S. FRESSON.

London Helicopter Operations

FLIGHT has recently given some prominence to the problem of helicopter noise, and now I see that the L.C.C. disapproves of the operation of helicopters from the South Bank site because of their noise. Their decision is presumably based on the few tests which have been made with relatively noisy piston-engined helicopters, and with no attempt made to baffle the sound on the ground.

In discussing his recent lecture, "An Introduction to Helicopters," Mr. J. D. Sibley, of the Bristol Aeroplane Co., Ltd., mentioned that the Bristol 173 was only slightly noisier than the 171. In other words, we cannot expect multi-engined helicopters to be much louder than existing single-engine types, on which comparatively little effort can have been directed towards external silencing.

Could not the South Bank site be surrounded on three sides by sound-absorbent or reflecting screens, the sound thus being reflected upwards or towards the river? I cannot believe that the remaining sound could be any worse than the admittedly noisy trains already in the area. With an "air station" atop Waterloo railway station, surely the sound would affect a larger area, and a more residential one at that.

Anyway, let us hope that more attention will be given to silencing by ground installations rather than by reducing the marginal payload of the helicopter still further by carrying silencers of a super-efficient type.

Tadworth, Surrey. M. M. GATES.

AEROMODELLERS GET THROUGH

INTERFERENCE from the weather is accepted to be a probable factor at most model aircraft flying meetings—but not at club dinners. The Northern Heights Model Flying Club was therefore distinctive, if unfortunate, in holding its 21st anniversary dinner and dance during the foggiest London week-end for many years.

The weather had prevented not a few guests from arriving, including Air Chief Marshal Sir Hugh P. Lloyd, and Mr. Neville Spriggs of Hawkers; also unable to be there were S/L. Neville Duke and Mrs. Duke. But the dining hall was agreeably full when, after a short time-lag to accommodate amended E.T.A.s, dinner was served. In the chair was Dr. A. P. Thurston, M.B.E., D.Sc., president of the club, who was accompanied by Mrs. Thurston.

The president first read out good wishes received from Queen Elizabeth the Queen Mother, in reply to a message sent by the club on the anniversary occasion. The health of the club was proposed by Mr. M. R. Knight, who reviewed from his own memory the highlights of the club's life since its early flying days on Parliament Hill. Mr. A. T. Widgery replied; although they had not all been with the club for 21 years, he spoke for all the members in looking forward to an equally successful 21 years to come. Mr. Malcolm Young proposed the health of the guests, and a brief, humorous reply was made by Dr. R. W. S. Cheetham, who is vice-president of the South African division of the Royal Aeronautical Society (*not* the Royal Aero Club, as inadvertently stated in the report of the S.M.A.E. dinner in our issue of December 5th). Replying to the toast "The Ladies," proposed by Mr. G. Moss, Mrs. Buckingham, one of the club's most active members, claimed that aeromodelling was always useful—even in the home.

Cups and trophies were then presented to the season's winners by Mrs. Cheetham, a message was read from Mr. C. A. Rippon, unfortunately unable to be present, and the club's birthday cake was cut by Mrs. Rippon.

The friendly informality of these Northern Heights occasions was continued further in the dance that followed, with Mr. Max Coote as M.C.

FROM THE CLUBS

THE Herts and Essex Aero Club's 21st anniversary dinner dance on December 5th confirmed our opinion—formed after enjoying several of the club's previous functions—that we have yet to attend a more pleasant or happier annual occasion.

At the Park Lane Hotel—the London fog having failed to keep empty a single seat that we could see—Mr. V. A. Ercolani took the chair. The V.C.A.S., A.V-M. Sir John W. Baker, proposed the toast of "The Club." He referred to the extension of the A.T.C. flying scholarship scheme and made it clear that he believed the clubs had a most important part to play in spreading air-mindedness among young men at the right age.

The chairman, in his reply, thanked the various officers and members of the club individually for their work. Naturally, the Frogleys and Mr. F. E. Darlow came in for special mention.

As a souvenir of the 21st anniversary a booklet containing the names of all known pilots trained by the Herts and Essex Club was given to each guest. The chairman's name is No. 4 on the list in the first year—1931. Until 1939 all named in the lists obtained pilots licences; in post-war years first solos are indicated. The numbers trained each year since 1946 are of interest: 1946, 23; 1947, 36; 1948, 23; 1949, 13; 1950, 17; 1951, 37; 1952, 44. In 1939, 170 pilots were trained. The total for the 21 years is 521.

The present C.F.I., Mr. Peter Ayles, has personally trained 98 pupils up to solo, and he recently launched Stirling Moss—who, though he is used to driving cars considerably faster than the Auster flies, is reported to be a very apt pupil with a healthy respect for an aircraft.

Congratulations to the Herts and Essex Club on its energetic and enterprising 21 years.

THE reorganized Elstree Flying Club, now operated by Wolverhampton Aviation, Ltd., held an informal celebration last Saturday in its redecorated club-house. Full catering and bar facilities are now provided in the new quarters by Mr. and Mrs. G. Hilder; visitors, we are assured, will receive a warm welcome.

For those who have not yet visited Elstree since the reorganization, we may add that Mr. David F. Ogilvy has taken over as C.F.I.-manager, and Mr. A. D. Pickup, who has been an instructor at Elstree for some years, continues to serve at week-ends. The Club also has the occasional help of Mr. R. J. H. Saunders, an R.A.F. instructor on Oxfords. The resident fleet at Elstree consists of three Autocrats and two Magisters, and the parent company is able to provide a dual Gemini on request. In addition to these, the Club can call on other machines operated by the parent company, and plans to provide Rapide flying at £11 per hour for "more ambitious" members. The rates for the other machines are £3 3s per hour for Autocrats, £3 for Maggies, and £6 for the Gemini.

Plans are in hand for competitive events, and for a start a challenge has been sent to, and accepted by, Denham Flying Club. The event is to be a spot-landing contest and the team will probably comprise four pilots using one each of the Club types, Autocrat and Magister.

BETWEEN May and October members of the Plymouth Aero Club flew a total of 630 hours. Although this is a good total, September and October (which are generally among the busiest months) were disappointing for the Club, and it is estimated that the bad weather resulted in a reduction of some 100 hours' flying during the last seven or eight weeks.

LOOKING well ahead, the Denham Flying Club is planning a Coronation garden party to take place on Saturday, June 6th, 1953. There are to be flying competitions open to members of other clubs, and a display which will include demonstrations of new types of aircraft, formation flying and parachute jumps. Denham, incidentally, also boasts the attraction of a swimming pool.

PLENTY of activity is reported from the Yorkshire Aeroplane Club, Sherburn-in-Elmet. The R. H. Braime Trophy was won by Mr. Arnold Wilson, with Mr. Danby Barber and Mr. Chris Riddell close behind. A timely reminder has been given to members to brush up their instrument flying with Mr. Frank Morgan, the C.F.I. Proctors for solo flying are now offered at £5 per hour, and it is felt that this will make week-end parties on the Continent a reasonable proposition. Two new Club members have signed on, and two more cadets were recently welcomed into the circle.

On the lighter side, a dance was held last Saturday for which the R.A.F. Church Fenton band had been engaged, while on Saturday, January 3rd, there is to be a New Year party.

IT is learned from Hants and Sussex Aviation, Ltd., of Portsmouth Airport, that they have taken over from A.S.T. a fleet of aircraft which includes 13 Tiger Moths, two Proctors, and a Whitney Straight. These machines are to undergo a complete overhaul before being exported to various foreign countries.

MR. MAURICE IMRAY has recently been appointed secretary of the Ultra-Light Aircraft Association, in place of Mrs. Rosemary Lindsay Neale (widow of Robert Lindsay Neale, the Boulton Paul test pilot) who has given up her post due to ill health. Mrs. Lindsay Neale hopes to continue her work for the Association later, as assistant honorary secretary.

DESCRIBED as the first social function of the winter season, a rum-punch party is to be given by the Southern Aero Club in the terminal building at Shoreham Airport tomorrow, Saturday, December 20th. Punch will be served at 7.30 p.m. sharp, to be followed by a running buffet and dancing until 1 a.m.

AT the A.G.M. of the Strathtay Aero Club, held in the club-house at Scone, the chairman, Mr. R. B. Henderson, said that the output of qualified pilots had been very satisfactory. In the preceding 12-month period, 46 student pilots had obtained their P.P.L.s. Flying time had amounted to 1,500 hours. C. of A. overhauls had caused serviceability to be low during November, but, even so, a total of 125 hours 15 minutes had been completed, and one A.T.C. cadet and one club member had qualified for their P.P.L.s during the month.

FIVE new world records are confirmed in F.A.I. Circular No. 66. In the world class records, Class C.1.b, for aeroplanes between 500 and 1,000 kg, Mr. Robert E. A. Goemans of Belgium has set a new distance in closed circuit without landing. On August 12th, in a Piper Pacer (125 h.p. Lycoming engine), with a weight of 853.500 kg, he flew the 2,500 km circuit Toussus-le-Noble, Tours, Bourges, Toussus.

Also in C.1.b, Tom Hayhow's Copenhagen-London record is now officially recognized. This was accomplished in his Auster Aiglet Trainer (D.H. Gipsy Major 1G engine), the weight being 998.800 kg, the duration 4 hr 21 min 45 sec, and the average speed 219.420 km/hr. This flight comes under the heading of "Course Records."

The other three records are in the class for gliders, the first being set up by Laurence E. Edgar, pilot, and Harold E. Klieforth, passenger, in Class D/2 for multi-seat gliders. Flying a Pratt-Read PR-G1 sailplane from Bishop, California, on March 19th, 1952, they achieved an absolute height of 13,489 metres, which represented a gain of 10,493 m.

In the section for women's records, Anna Samocadova, of the U.S.S.R., achieved the speed of 53.665 km/hr over a 100-km triangular course on August 5th, 1952. She flew an A-9 sailplane over a circuit *via* Grabtsevo, Makarovo, Peremychl and Grabtsevo. The same pilot, accompanied by A. V. Neventchannaya, achieved a speed of 64.285 km/hr over the same circuit on July 30th to set up a new record in Class D/2 for multi-seat gliders. On this occasion she used an A-10 sailplane.

FORTHCOMING EVENTS

Dec. 19-20.	Institution of Production Engineers: Conference on Problems of Aircraft Production.
Dec. 20.	British Interplanetary Society, Manchester Branch: "Rocket-motor Testing," by D. Hurden, B.A.
Dec. 20.	Southern Aero Club: Rum Punch Dance.
Dec. 30.	Plymouth Aircraft Recognition Society: Meeting.
Jan. 3.	British Interplanetary Society: "Planetary Engineering," by E. Hope-Jones, M.A.(Cantab.), F.R.A.S., A.M.I.Mun.E.: "Landing on Airless Planets," by R. A. Smith.
Jan. 17.	Aircraft Recognition Society: Sixth All-England Recognition Contest.
Jan. 17.	British Interplanetary Society: "Cosmic Radiation, its Intensity and Biological Effects." Lecturer to be announced.
Jan. 29.	R.Ae.S.: "Titanium," by Maj. P. Litherland Teed, F.R.Ae.S., M.Inst.Met., M.I.M.M.
Feb. 7.	Helicopter Association: Discussion on Standards of Maintenance, and Requirements for Helicopter Engineers' Licences. Papers by Members of the A.R.B. and S.L.A.E.
Feb. 9.	Institute of Transport: Brancker Memorial Lecture: "The Influence of Military Aviation on Civil Air Transport," by Sir Frederick Handley Page, C.B.E.
Mar. 6.	Helicopter Association: Discussion on Flight-testing Experiences: contributions by C. T. D. Hosegood, S/L. W. R. Gellatly and Capt. J. A. Cameron.
Mar. 14.	The Cranfield Society: A.G.M. and Dinner.
Mar. 24-26.	Institute of Metals: Annual General Meeting and (Mar. 25) All-day Symposium on "Control of Quality in the Production of Wrought Non-ferrous Metals."
Mar. 27.	R.Ae.S.: Full-day Discussion on "Fatigue" (postponed from Dec. 18).

the way ahead

BEA BRINGS DOWN THE PRICES

It has always been BEA's aim to provide popular priced air travel for all who care to enjoy it. Already you can reach Paris in under two hours for £11.14.0 return (and as little as £9.15.0 return if you fly by night), and now this winter you can fly from London to Glasgow or Edinburgh for as little as £8 return; to Belfast £10 return, and to Isle of Man £8.10.0 return. All these fares are from airport to airport. For an increasingly air-conscious world the future has never looked brighter—BEA is looking ahead.

fly **BEA**

BRITISH EUROPEAN AIRWAYS

Instruments for Repair?

Wynn

Overhaul and Release of all types of Aircraft Instruments

Luminous and Fluorescent Dial work

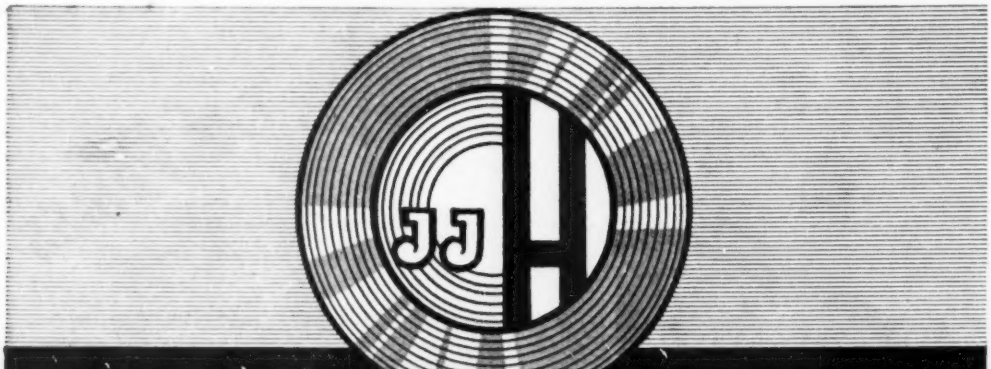
send them to

A.I.D. and A.R.B. Approved

Wynstruments LIMITED

STAVERTON AERODROME GLOUCESTER

Phone: Churchdown 3264 (3 lines)



STEEL STRIP

SHEETS AND SECTIONS

TO A.I.D. SPECIFICATIONS

HABERSHON

ROTHERHAM

THE INDUSTRY

Alvis Expansion

IN order to provide additional working capital, Alvis, Ltd., are doubling their borrowing powers, to £1,400,000. In his statement to shareholders, Mr. J. J. Parkes, A.F.R.Ae.S., the chairman, says that "for some time to come, rearmament work, principally in the form of contracts for armoured fighting vehicles and aero engines, will constitute the greater part of the company's turnover."

Explaining to the uninitiated the scope for a piston engine—such as the forthcoming 870 h.p. Leonides Major—Mr. Parkes points out the "strong arguments for continuing the use of the piston engine in many civil and military operations at lower altitudes and speeds than gas turbines."

Dowty Progress

AT the sixteenth annual general meeting of Dowty Equipment, Ltd., held on December 8th, at Arle Court, Cheltenham, Mr. G. H. Dowty, F.R.Ae.S. (chairman) said that the group's current sales of equipment for British aircraft were higher than at any time since the war. They were proud that, among the super-priority aircraft, the Hawker Hunter, Gloster Javelin and Avro 698 had Dowty undercarriages and hydraulic equipment. Other new types for which the company was supplying equipment were the French Marcel Dassault Mystère, the Vickers-Armstrongs Swift and the Saunders Roe Princess flying-boat.

In his review of the progress of the overseas companies, the chairman said that last summer he had visited Dowty Equipment of Canada, Ltd., and was pleased to report a satisfactory position. Plans for extending the Ontario factory had been approved.

The company was providing the first aircraft undercarriage drop test rig ever to be installed in Canada. It would be capable of testing undercarriages for an all-up weight of 150,000 lb and it would no longer be necessary for Canadian aircraft constructors to rely on England or the United States for such tests.

Of Dowty Fuel Systems, Ltd., the chairman said that this subsidiary had pioneered that particular type of fuel system for gas turbines known as "spill control." This normally required two pumps for satisfactory operation—but the company have successfully tested a single-pump spill system with an integral all-speed governor. This had reduced the complexity of the original arrangement and indications were that this system would be widely adopted.

Dowty fuel pumps were now fitted as standard on Sapphire, Ghost, Goblin, and Double Mamba engines and on the American TJ32C and J65.

In his financial statement, Mr. Dowty told shareholders that the group's profit, before taxation, was £560,011—an increase of £129,825 over the figure for the previous year. There was, however, a heavy increase of £98,532 in the amount required to meet taxation liabilities.

CONVIVIALITY (2): Snapped at a Londonderry House cocktail party last Friday: A. Cdre. P. S. Blockey, Director of Aircraft Engineering, Air Ministry, chats with Mr. J. R. Sharp (right), director of Lansing Bagnall, Ltd. This firm of mechanical-handling specialists gave the party for their customers and their friends in the Services and supply departments, and among topics of conversation was the new aircraft-handler described and illustrated in "Flight" of July 25th.

CONVIVIALITY (1): W/C. C. G. B. McClure (left), head of the Department of Flight at the College of Aeronautics, Cranfield, with Mr. and Mrs. R. W. Jamieson at a recent informal dinner of the de Havilland Technical School Old Boys' Association. Formerly a D.H. production test pilot, Mr. Jamieson is now on the sales staff. Guest of honour at the dinner was Mr. R. E. Hardingham, chief executive of the A.R.B., and among his hosts was Mr. F. T. Hearle, president of the Association.

Hard-facing Alloys

FROM A. S. Young and Co., Ltd., Tower Works, Woodside Lane, North Finchley, London, N.12, comes news that A.I.D. approval (No. 422904/35) has been given for the application of "Colmonoy" alloys to aircraft components.

The name "Colmonoy" designates a series of alloys available in various forms (e.g., as welding rods, paste and powder) for the hard-facing of metallic components by furnace, spray, oxy-acetylene or electric-arc welding.

Of particular interest to the aircraft industry is a method whereby a nickel-base alloy is sprayed on to components and subsequently fused by special heat-treatment. This, it is stated, produces a deposit which is smooth, free from porosity or hair-cracks, and of accurately controlled thickness. The deposit has a hardness of up to 60 Rockwell "C," depending on the grade of "Colmonoy" used, and is resistant to abrasion, corrosion, oxidation and other deleterious influences.

Personal Equipment

A GLANCE through the latest catalogue of flying, motor cycling and motoring clothing issued by D. Lewis, Ltd., 124 Great Portland Street, London, W.1, indicates how thoroughly this old-established firm has studied the requirements of users.

Among the items described and illustrated are R.A.F. regulation-pattern helmets, equipped for, or supplied with, oxygen mask and intercom; civil-type helmets and Gosport tubes; and various types of overall flying suits, together with engineers' overalls. Many types of goggles, gloves and flying boots are also illustrated.

It is stated that any of the items listed can be supplied immediately from stock, and that special articles of clothing to customers' own specifications can be made available in 24 hours.

IN BRIEF

The London offices of two battery manufacturers, the Tudor Accumulator Co., Ltd. (Dukinfield, Cheshire) and Pritchett and Gold and E.P.S. Co., Ltd. (Dagenham Dock, Essex), have been moved to 137, Victoria Street, S.W.1. Telephone numbers are, respectively, Tate Gallery 0307 and 9212.

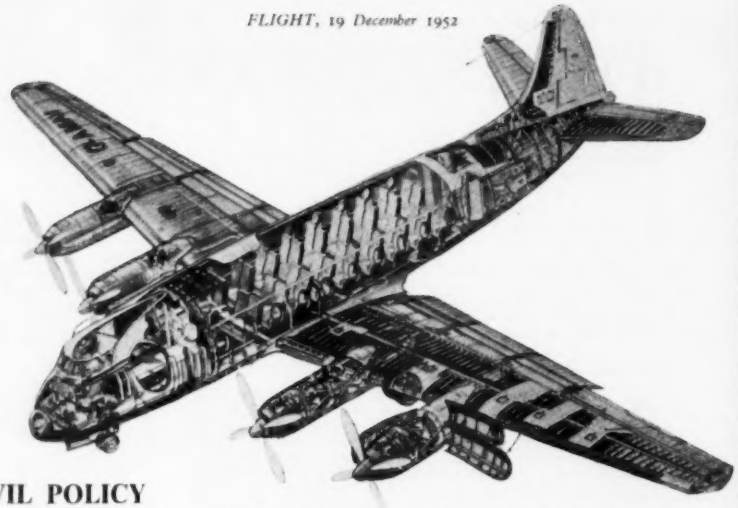
* * *

Mr. Ian M. Gillett, general manger of Silentbloc, Ltd., has been appointed managing director, and Mr. Brian H. Dulanty has been appointed to the board. Mr. S. Buchan, M.A., B.Sc., Ph.D. (Cantab), F.R.I.C., F.I.R.I., general manager of the Andre Rubber Co., Ltd., a subsidiary of Silentbloc, Ltd., has been appointed to the Andre board.

* * *

Southern Forge, Ltd., of Langley, Bucks, one of the Almin group of companies, announce that Mr. L. E. Young, sales manager, has been appointed a director. When the late Col. W. C. Devereux was appointed to the Light Alloy Control in 1939, Mr. Young was concerned with Mr. Hugh Perry in setting up the Forgings Control at Farnham Royal. At the end of the war, he was appointed commercial sales Manager of Elkington and Co., Ltd., of Birmingham. Subsequently, upon the formation of the Almin group, Mr. Young rejoined Col. Devereux, and in 1946 was appointed sales manager of the extrusion and forging plant.

CIVIL AVIATION



VISIBLE EXPORT: The Vickers-Armstrongs Viscount is prominent among the new British aircraft which, says the Air League statement below, "will carry the air traffic of the future." This "Flight" cutaway drawing—originally reproduced in colour—displays practically all the features of production versions ordered by B.E.A. and several overseas operators; the only significant change will be the number of seats fitted, since most airlines favour a higher-density layout (such as that shown below).

A NON-POLITICAL CIVIL POLICY

BRITISH civil aviation has been the subject of many speeches and debates in recent months. There has been widespread agreement that the United Kingdom has a great opportunity in the growing sphere of world air transport, but the suggested methods of seizing this opportunity have, all too often, displayed political bias in one direction or the other.

The latest pronouncement on the subject, made on December 9th by Air Chief Marshal Sir Guy Garrod, chairman of the Air League of the British Empire, is refreshingly non-political in its outlook. Feeling that the views of the Air League on this vital topic deserve a wide and sympathetic hearing, we quote below a number of significant passages from Sir Guy's speech :—

"The enormous further expansion of world air traffic which is clearly going to take place, coupled with the arrival of the jet and prop-jet transport aeroplane, means that the air age, about which so much has been said and written since the end of the war, is now really developing . . . this has coincided with what it is no exaggeration to describe as a burst of inspired genius on the part of our aircraft and aero-engine designers and manufacturers. As a result, this country finds itself with a range of transport aircraft for sale which is years ahead of anything which any competitor has to offer.

"Here then are our two great opportunities: one is to attain a dominating position in the world air-carriage market, and particularly in cargo; the other is to capture the world market for new types of aircraft which are to carry the air traffic of the future.

"But where there should be a common effort there are, instead, considerable differences, and a good deal of dissension. British civil aviation since the war has become a political football. British air operators have been forced into two camps, represented by the national airlines and the independent operators. Their relations and their future have become the subject of bitter wrangling. In view of what is at stake, this will not do.

"The nationalized airlines, of course, are here to stay. No sane person would think of breaking them up. Moreover, any businessman knows that the success of such undertakings depend on continuity of management and long-term planning. . . . On the other hand, we do not believe that the great expansion of British air traffic which is necessary . . . can be possible without a great development in the operations and the equipment of the independent operators.

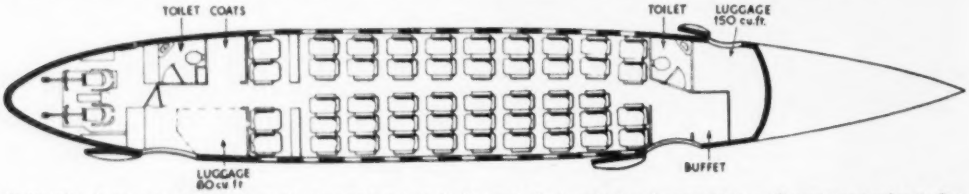
"The future of British civil aviation should by common consent be removed from the sphere of party politics. It is primarily a commercial and business matter, involving, as well, important considerations of national defence . . . the independent operators represent virtually our only reserve.

"We do not believe there is any ground for suggesting that the livelihood of those who work for the national airlines is threatened by properly planned expansion of the operations of the independent operators. The potential market for world air carriage is far too great. And is there not another powerful interest which could help in this great task? . . . Cannot the airlines and the shipping lines join up to sell each others' cargo services over the many routes where they do not compete.

"We believe that if the businessmen who operate both our national airlines and our independent operating companies could sit down together as businessmen they could devise means of co-operation which would represent a great service in the public interest. . . . The trade unions also should have a place in these discussions. . . . Is it not possible that a reconstituted Air Transport Advisory Council, perhaps under a different name and on a broader basis, could ultimately become an association embracing all interests—including industry and the public? . . . . Could it not reach out and establish co-operation with the other nations of the Empire and with the Colonies? Can we not consider a Commonwealth Air Transport Association on these lines?

"The affairs of civil aviation and air transport should be powerfully represented in the highest councils of the Government. First of all we need a more unified effort within the Government machine. At present four departments are involved in the production of civil aircraft, and in the financing of the Corporations and of the independent operators. These departments are the Treasury, Ministry of Supply, Ministry of Transport, and Ministry of Civil Aviation. This is not the way to get big decisions. The Ministry of Civil Aviation at present has not sufficient power. . . . Either it should be taken right away from the Ministry of Transport and raised in status, with its Minister in the Cabinet, or it should be merged in the Ministry of Transport, using the status and power of that Minister.

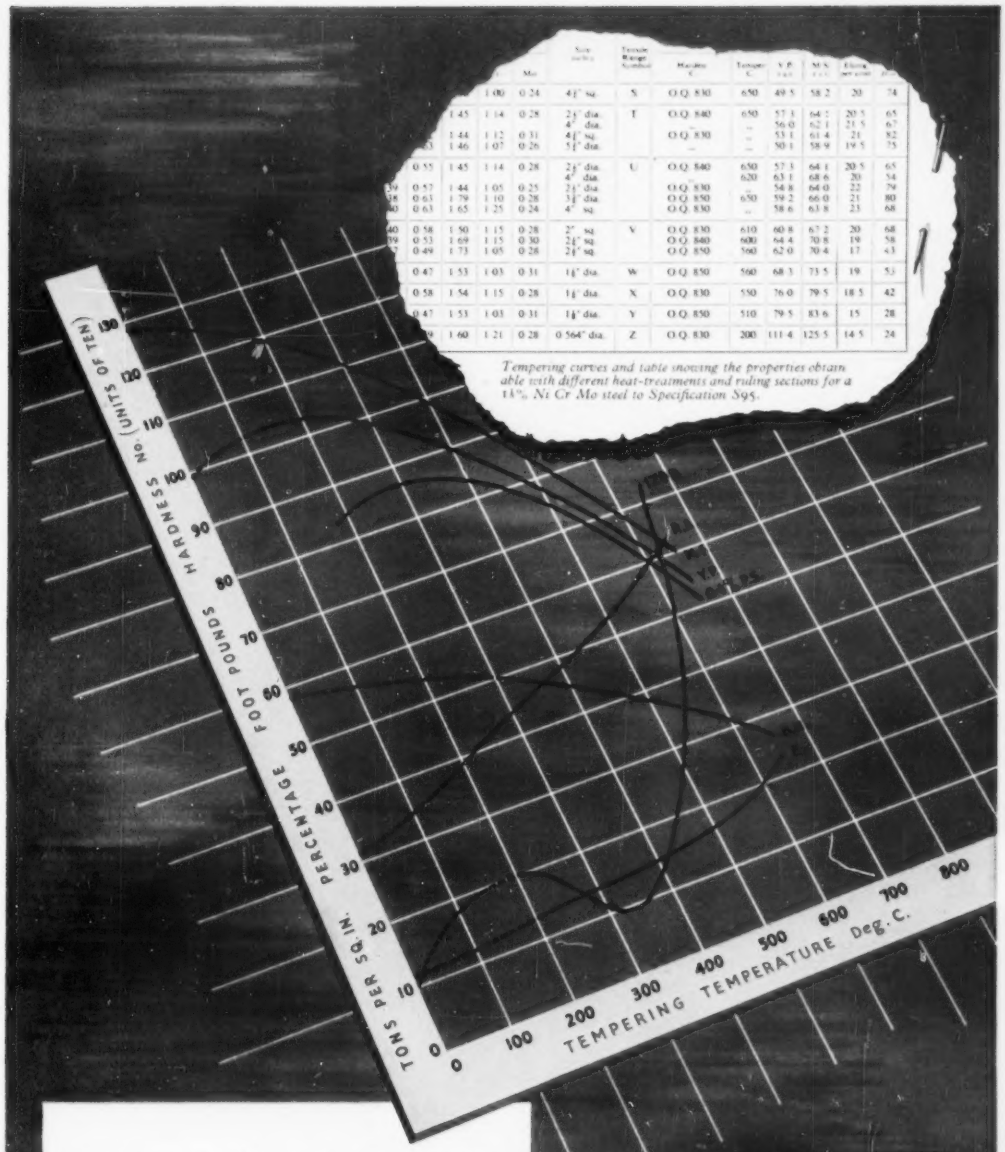
"Finance has a special importance for our independent operators because if they are able to play their full part in the world market and as the indispensable reserve of air transport for the Services in an emergency, they must somehow be enabled to procure, on reasonable terms, and quickly, modern cargo aircraft, especially long-range equipment. They must also be given long-term assurance of the services which may be allotted to them."



48-SEATER: As this typical layout shows, there is ample room in the Viscount's fuselage for five-abreast seating; a 48-seater interior has, in fact, been chosen by Trans-Canada Air Lines, who will operate 15 of the 63 Viscounts now on order. Seats will be mounted on rails, enabling quick conversion to a tourist-class layout for as many as 54 passengers.

		1·00	0·24	4" sq.	S	O.Q. 830	650	49·5	58·2	20	74
	1·45	1·14	0·28	2½" dia.	T	O.Q. 840	650	57·1	64·2	20·5	65
				4" dia.			620	56·0	62·1	21·5	67
	1·44	1·12	0·31	4" sq.		O.Q. 830	...	53·1	61·4	21	82
53	1·46	1·07	0·26	5" dia.		...	...	50·1	58·9	19·5	75
	0·55	1·45	1·14	0·28	2½" dia.	U	O.Q. 840	650	57·3	64·1	20·5	65
					4" dia.			620	63·1	68·6	20	54
39	0·57	1·44	1·05	0·25	2½" dia.		O.Q. 830	...	54·8	64·0	22	79
38	0·63	1·79	1·10	0·28	3½" dia.		O.Q. 850	650	59·2	66·0	21	80
40	0·63	1·65	1·25	0·24	4" sq.		O.Q. 830	...	58·6	63·8	23	68
40	0·58	1·50	1·15	0·28	2" sq.	V	O.Q. 830	610	60·8	67·2	20	68
39	0·53	1·69	1·15	0·30	2½" sq.		O.Q. 840	600	64·4	70·8	19	58
37	0·49	1·73	1·05	0·28	2½" sq.		O.Q. 850	560	62·0	70·4	17	43
	0·47	1·53	1·03	0·31	1½" dia.	W	O.Q. 850	560	68·3	73·5	19	53
	0·58	1·54	1·15	0·28	1½" dia.	X	O.Q. 830	550	76·0	79·5	18·5	42
	0·47	1·53	1·03	0·31	1½" dia.	Y	O.Q. 850	510	79·5	83·6	15	28
39	1·60	1·21	0·28	0·564" dia.	Z	O.Q. 830	200	111·4	125·5	14·5	24

Tempering curves and table showing the properties obtainable with different heat-treatments and ruling sections for a 1¼% Ni Cr Mo steel to Specification S95.



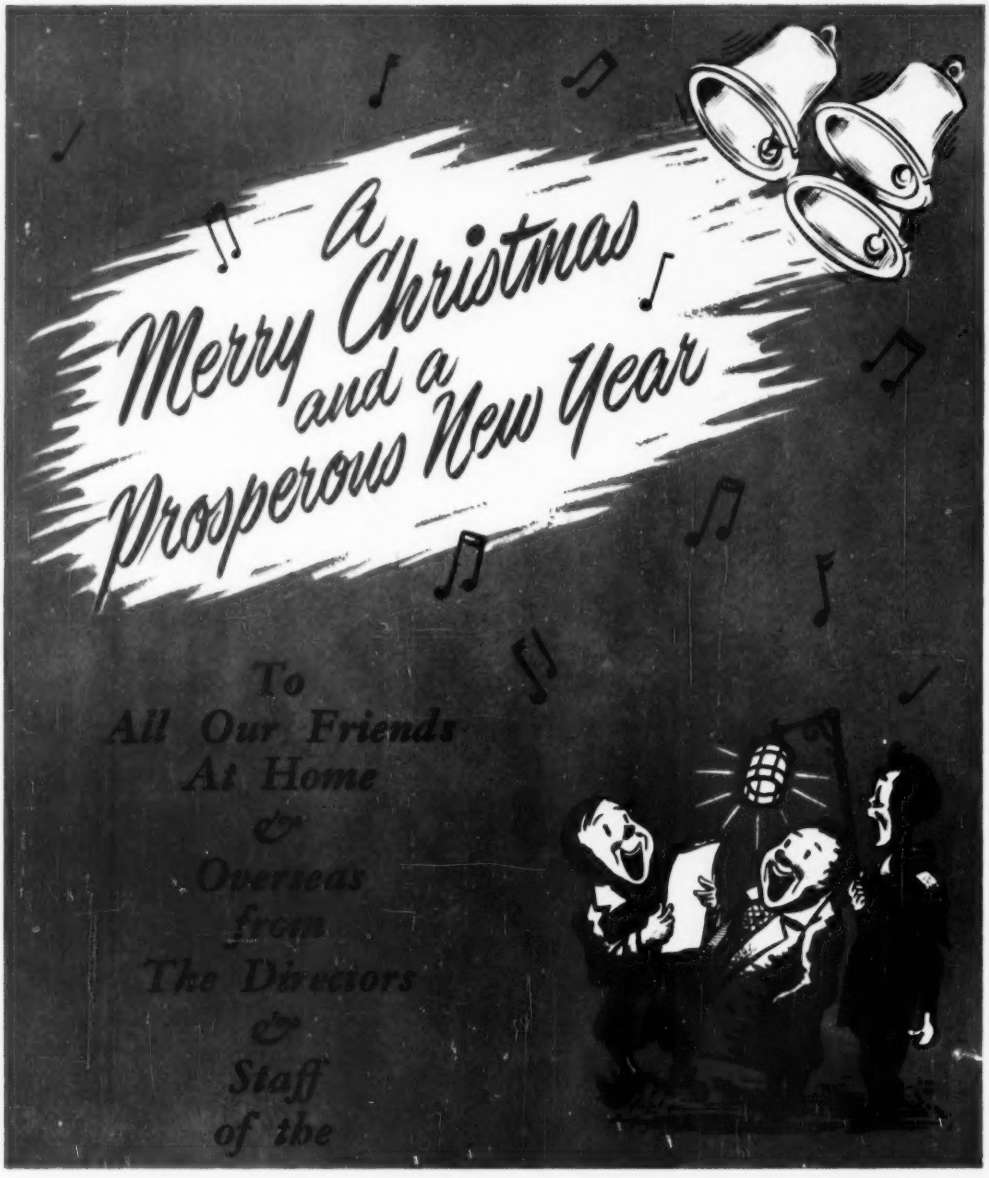
ECONOMY IN THE USE OF ALLOY STEELS

is a necessity today, and our publication "The Mechanical Properties of Nickel Alloy Steels" will assist the user to make two ends—properties and availability—meet. The tempering curve and table reproduced here are from this publication, which covers a wide range of direct-hardening, case-hardening and nitriding steels. Write for a free copy to:

THE MOND NICKEL COMPANY LIMITED

SUNDERLAND HOUSE · CURZON STREET · LONDON W1

12/51.72



AVIATION TRADERS GROUP

15, Great Cumberland Place, London, W.1.

Telephone : AMBASSADOR 2091 (5 lines). Cables : AVIATRADE, LONDON.

AVIATION TRADERS (ENG.) LTD. ● AVIATION TRADERS LTD. ● AIR CHARTER LTD.

SURREY FLYING SERVICES LTD. ● FAIRLIGHT LTD.

CIVIL AVIATION . . .

ADEN AIRWAYS' FINANCIAL RESULTS

FOR the third year in succession Aden Airways have announced a profit. The operating surplus for the year ended March 31st, 1952, was £11,570, which is £9,645 less than the surplus for 1950-51. Traffic figures are not yet available.

Aden Airways, a wholly owned subsidiary of B.O.A.C., became self-accounting under its own board of directors on October 1st, 1949. The company is based at Aden and operates six DC-3s over a network extending from Damascus and Cairo in the north to Nairobi and Mombasa in the south.

NEW FAR EAST AIRLINE

MOSCOW radio has announced the formation of Sino-Soviet Civil Airlines. No details of equipment were given, but it was stated that the new airline would operate twice weekly services between Peking and Shanghai; other services, the frequency of which was not disclosed, will be on the following routes: Peking - Hankow - Chungking; Shanghai - Hankow - Chungking: Chungking - Kunming; Canton - Kunming: Canton - Chankiang (Kwangchouwan); Peking - Mukden - Harbin - Tsitsihar - Chita; Peking - Sian - Lanchow - Tuhue - Alma Ata, and Peking - Ulan Bator-Irkutsk.

SOUTH BANK "UNSUITABLE"

RECENT noise-level tests with B.E.A. helicopters at the South Bank site showed that no annoyance would be caused either in the council chamber at nearby County Hall or in the auditorium of the Royal Festival Hall if the machines maintained a height of 1,000ft. This was revealed in a report made recently to the L.C.C. by its General Purposes Committee, which stated, however, that "annoyance would be caused to occupants of rooms in both buildings whenever the machines came below that height . . . and that the introduction of more powerful types will tend to increase this difficulty." The committee concluded that the site would not be suitable for a permanent helicopter landing-ground, and put forward its view that the possibility of constructing an elevated platform over Waterloo Station was "well worth considering."

AN AUSTRALIAN YEAR

FOR the first year since the end of the war there has been a slight decrease in some aspects of Australian airline activity. Figures for the 12 months ended June 30th, 1952, show that, on the domestic services, route mileage increased by 8.8 per cent to 86,600; the number of miles flown went up from 42m to 43.24m and there was a slight increase in the total number (1,879,000) of passengers; but the amount of freight carried was 52,058 tons, compared with 53,483 tons during the previous year, and mail ton-miles flown decreased from 1.4m to 1.2m. At 34,743 miles, route mileage on the international services showed a slight drop on the previous year's figure but the number of miles flown was greater —8m compared with 7.7m. The total number of passengers on the international services increased by 7,000 to 47,500 and there were also improvements in the figures for freight (1,032 tons) and mail (5m ton-miles).

DISUNITED

THE decision of United Air Lines to reduce, for reasons of safety, the number of passengers carried by aircraft on their "coach" services is responsible for a bitter controversy in American airline circles. The type of aircraft concerned is the DC-4, although (as our American correspondent writes on page 754) wider issues are involved.

In the United States, the Civil Aeronautics Board lays down both minimum and maximum numbers of passengers carried in coach aircraft. The minimum figure is, of course, established to prevent unfair competitive practices by airlines who are prepared to offer low-capacity services at coach fares in order to attract traffic. Safety considerations are behind the fixing of a top limit. In the case of the DC-4 the maximum number allowed is 86 (including crew), providing one exit per 17 passengers. Consideration is made for the DC-4's obsolescence, and a much lower passenger-per-exit ratio is required in more modern aircraft. In practice, DC-4s used on American domestic coach services have provision for 60-79 passengers, according to the ideas of the different airlines concerned. United Air Lines, however, have decided to reduce their DC-4 coach capacity to 54 passengers, eliminating three-abreast seating. Pending removal of the centre seats, passengers will not be allowed to sit three-abreast during landing and take-offs.

According to an *Aviation Week* report, the new U.A.L. capacity is below the minimum stipulated by C.A.B. for day coach-services. The journal comments that "by cutting his coach seating density, Patterson [president of United] is forcing the Board to suspend his coach tariff," adding that "United may have to file a higher coach fare than competitors everywhere." Patterson's decision was naturally unpopular with other American airlines and, possibly, with the C.A.B., since it implies lack of consideration on the Board's part for the safety of passengers. U.A.L.'s competitors naturally feel that a public debate on the safety of coach services is bad for an expanding business, and have not published any comments. It has been pointed out, however, that coach services operated with more modern aircraft than the United's DC-4s are in most cases safer in terms of persons-per-exit ratio; Pan American 82-seat DC-6Bs, for example, have one emergency exit for every seven passengers, compared with one exit for 11 passengers in a 54-seat DC-4.

OVER SYDNEY BRIDGE is pictured one of the six Lockheed Constellations operated on long ranges by Qantas Empire Airways. The most recent route to be opened is the 8,665-mile Indian Ocean crossing from Sydney to Johannesburg, which has been named the "Wallaby Service." The name, suggested by Maj.-Gen. C. J. Venter, manager of South African Airways, indicates its relationship to the B.O.A.C.-Qantas "Kangaroo Service" between London and Sydney.

AERLINTE PLAN OPPOSED

A RECENTLY announced agreement between Aerlinte and Seaboard and Western Airlines (*Flight*, December 5th) was the subject of a sharp exchange between Eire Government and Opposition speakers in the Dail on December 10th. The Aerlinte plan, it will be recalled, involves the charter of Seaboard DC-4s and crews to operate transatlantic passenger services between New York, Boston and Shannon. Mr. Sean Lemass, Minister for Industry and Commerce, explained that when Aerlinte was forced by the Government to suspend its plans for transatlantic services in 1948, its assets of £1,882,010 were transferred free of interest to the Government. These assets, however, were in excess of the original capital outlay of £457,005 and this sum was to be invested in the proposed transatlantic services; therefore there would be no cost to the taxpayer. (In effect, the new service will be launched on the proceeds of Aerlinte's profitable sale of five Constellations —which were never operated over the Atlantic—to B.O.A.C.) Mr. Lemass added that striking increases in traffic between America and Eire were anticipated, particularly in view of An Tostal, next April's Irish national festival.

His announcement evoked strong protests from the Fine Gael (Opposition) party, which in the last general election was defeated only by a narrow margin. Deputy Liam Cosgrave said that it was hard to understand the proposal to spend money on this service in the country's present circumstances. Presumably referring to the use of DC-4s in competition with faster, newer and more comfortable aircraft, he said that if the service were better than or equal to those of other airlines, they might attract passengers with Irish connections, but that the Irish airline would not attract the traffic purely through sentiment.

L.A.P. AND THE BATH ROAD

LONDON AIRPORT is not to be extended north of the Bath Road as previously planned. This was officially announced in the House of Commons by Mr. A. T. Lennox-Boyd on December 10th in answer to a question by Mr. F. Beswick (Lab., Uxbridge). The Minister said that careful analysis of the results of a programme of practical experiments recently concluded by his Department had shown that the additional amount of traffic which could be accepted by extending London Airport north of the Bath Road would not justify the expenditure and disturbance so incurred. He had, therefore, decided not to proceed with the plans for the extension and to release from safeguarding restrictions the area north of the Bath Road, apart from the approach-paths to the

CIVIL AVIATION . . .

existing runways. Mr. Beswick welcomed the statement, which, he said, would lift a great pall of anxiety from 650 families whose homes were threatened with destruction. The skill and ingenuity of technical officers of the Department would save some £10m of capital investments and the whole House should be grateful.

As recorded in a recent article on London Airport (*Flight*, October 10th), Stage 3 in the plan for L.A.P. development involved the construction of two 7,020ft diverging runways (permitting staggered take-offs and landings) in place of the third triangle of runways originally envisaged by an M.C.A. advisory panel in 1945. It was understood that the diverging runways would be built only if the increase in traffic demanded them, and that in any case they would not be laid before mid-1955.

In its present form, with six runways, London Airport should eventually be capable of handling about 90 aircraft hourly during peak periods, although the location of the temporary control-tower and passenger buildings prevents full use of runways No. 7 and No. 4. The daily average number of movements for 1952 is something like 100. Even allowing for the decrease in movements due to (a) the use of higher-capacity aircraft, and (b) the effects of the fuel strike earlier this year, the airport is evidently capable of handling a vast increase in traffic without further development.

CORPORATION'S JUNE RESULTS

MORE than 140,000 passengers were flown by B.E.A. during June of this year—an increase of 16 per cent. over the number for last June. The traffic was shared evenly between domestic and international routes, but the domestic services showed a bigger percentage increase. Load ton-miles totalled 4,075,000, at an overall load factor of 64.4 per cent. Freight traffic increased more than 20 per cent. on international services, but decreased on the domestic routes, effecting an overall increase of 7 per cent.

B.O.A.C.'s June statistics, referring to the first four weeks and not the full calendar month, show that 22,000 passengers were carried. A total of 10,243,000 load ton-miles was flown, at an overall load factor of 67.6. The associate company's services showed a considerable development over June, 1951; 50 per cent. more stage-flights were scheduled, and the load ton-miles performed increased by 89 per cent to 371,000 at an overall load factor of 66.4.

M.C.A. PILOTS' PAY-RISES

STAFF pilots of the M.C.A. Flying Unit are to receive pay increases back-dated to November 1, 1951, as a result of a Civil Service Arbitration Tribunal award announced last week. The eleven staff pilots, now getting from £1,075 to £1,198 per annum, are to receive from £1,200 to £1,400; the two flight captains, whose present rate is £1,254, will get £1,475; and the unit commander's salary will increase from £1,382 to £1,600. The original claim, made by the Institution of Professional Civil Servants, was for £1,535 (rising to £2,115) for staff pilots, £2,275 for flight captains and £2,400 for the unit commander.

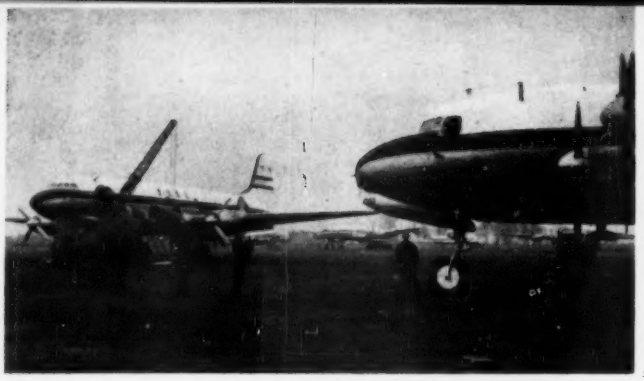
U.K.—JAPAN AGREEMENT

IT is reported from Tokyo that an agreement has been concluded there under which British aircraft are given landing rights at Fukuoka, Osaka, Okinawa and Tokyo, in return for Japanese landing rights at Hong Kong, Singapore, London and Prestwick. On August 11th, a similar agreement between the U.S.A. and Japan was signed, and two Japanese officials are reported to be in Europe at the present time, negotiating further bilateral agreements between their country and Holland, Sweden, Denmark, Norway, Belgium and France.

ROYAL COMET JOURNEY

QUEEN ELIZABETH the Queen Mother, and Princess Margaret are expected to request that a Comet be chartered for their forthcoming visit to Southern Rhodesia, where the Queen Mother will open the Rhodes Centenary Exhibition in Bulawayo on July 3rd. They greatly enjoyed their first experience of Comet travel last May and are believed to have expressed a preference for making next year's journey by jet airliner. Sir Miles Thomas announces that although arrangements are not yet complete it is hoped that the flight—probably to Salisbury instead of Livingstone—will take only 15 hours.

Another important honour for B.O.A.C. and the Comet is contained in the announcement that the speaker preceding her Majesty the Queen in the Christmas-afternoon B.B.C. programme *The Queen's Inheritance* will be Capt. T. B. Stoney, D.F.C., who will broadcast from the cockpit of a Comet at 40,000ft about 150-200 miles from London. Now a Comet pilot, Capt. Stoney commanded the Argonaut *Atlanta* in which the Queen returned from East Africa on her accession to the Throne.



DIVERSIONARY TALE: Many aircraft were diverted from London during the recent pea-soup fog, including the B.O.A.C. Hermes, Argonaut, Stratocruiser, Constellation and Comet pictured here at Hurn Airport.

I.C.A.O. DISCUSSES RADIO FREQUENCIES

THE I.C.A.O. special meeting for planning frequency-assignments in the European-Mediterranean region, held in Paris during November, adopted three schemes. The first extends, as from September 1st, 1953, the number of V.H.F. channels for R/T from 19 to 31, in view of the increasing demand from the European airways network and the growing use of radar for control; it also defines four additional V.H.F. channels for possible future expansion. The second transfers the *en route* H.F. communication services to new frequency bands, to be accomplished progressively as from June 1st, 1953, and the third is designed to make the most efficient use of the waveband available for the long-wave radio beacons used in the European airways network. The air communication and navigation situation in Europe is one of the most complex in the world, and it is hoped that the eventual implementation of these plans will effect a welcome improvement.

BREVITIES

THE two Model 049 Constellations recently acquired by B.O.A.C. from P.A.W.A. are to be converted by Lockheed Aircraft Service for 70-seat transatlantic tourist operation.

* * *

The appointment is announced of Mr. Raymond Birkett, D.F.C. as Civil Air Attaché to the British Embassy, Paris, to succeed Air Marshal Douglas Colyer, C.B., D.F.C. (Retd.), previously Civil Air Attaché, Western Europe.

* * *

Prestwick Airport's public enclosure attracted 62,245 visitors between April and October. This total was slightly smaller than in 1951, when a visit by the Brabazon drew 19,000 spectators in three days.

* * *

Under a contract between International Aeradio, Ltd., and the French Government, the company will provide and install synthetic air-traffic control training equipment at the French Civil Aviation School at Orly Airport, Paris, before the end of this year.

* * *

The Council of I.C.A.O. has accepted the invitation of the Brazilian Government to hold the Ninth Session of I.C.A.O.'s Legal Committee in Rio de Janeiro in August, 1953. The meeting's main task will be to study and revise a draft convention intended to replace or amend the Warsaw Convention, concerning the liability of air carriers.

* * *

In conformity with a recent I.C.A.O. recommendation, a revised form of flight plan will be standardized throughout Europe by March 1st, 1953; accordingly, the original U.K. flight plan was abolished on December 8th and a revised Form 48 is now used. A description of the new form, and instructions on its completion, are contained in M.C.A. Information Circular No. 114/1952.

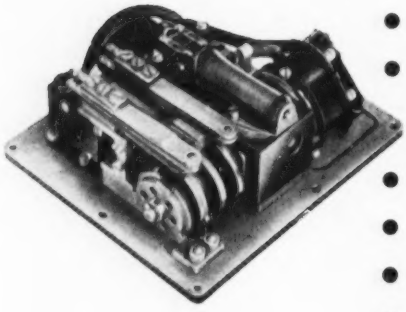
* * *

Swissair will use DC-6Bs on four extra services between London and Zurich between December 21st and 24th. The timetable shows that these 66-seat aircraft will complete the 500-mile journey in a block time of 3 hr 10 min, 15 minutes less than the time allowed for normal scheduled services by Elizabethans and Convairs. B.E.A. will meet the demand for extra traffic on this route by operating at least six extra services, the majority with Vikings, between December 19th and 24th.

C. C. WAKEFIELD & CO. LTD • GROSVENOR STREET • LONDON • W.1

Teddington

TURBO-STARTING TIME SWITCH



This switch incorporates a constant speed governed motor driving through a reduction gearbox, a bank of cams. It provides an automatic sequence of operations for the starting of gas turbine engines, and operates on a 24-volt D.C. supply (nominal). The switch will operate in temperatures ranging from −45° C. to +90° C., and is sealed to withstand internal pressure up to 2.5 p.s.i.

Teddington

Teddington AUTOMATIC CONTROLS

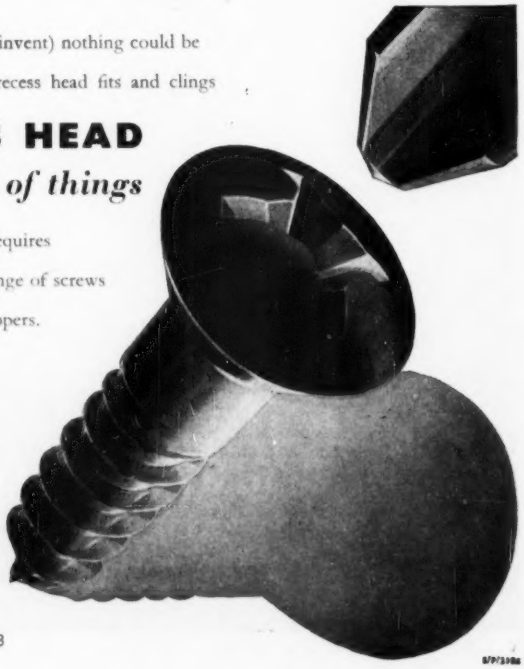
TEDDINGTON CONTROLS LTD., CEFN COED, MERTHYR TYDFIL, SOUTH WALES (Merthyr Tydfil 666)

Short of a self-driving screw (which G.K.N. have yet to invent) nothing could be easier to use than Phillips Recess Head Screws. The recess head fits and clings closely to the driver.

USE ITS HEAD

to make an easy job of things

The screw goes in straight and swiftly even in cramped or overhead positions and requires much less force. Phillips heads are available in a wide range of screws including wood screws, metal threads and N.P.K. self tappers.



PHILLIPS RECESS HEAD SCREWS

Quicker, Neater, Easier, Safer.

get in touch with GKN

GUEST KEEN & NETTLEFOLDS (MIDLANDS) LIMITED

SCREW DIVISION BOX 24, HEATH STREET, BIRMINGHAM 18

SERVICE AVIATION

Royal Air Force and Naval Aviation News

Malaya Operations

INCREASED activity is reported by R.A.F. and R.A.A.F. units operating in Malaya. The majority of the 400-odd sorties flown during November were to the credit of the Hornet squadrons. Concentrated attacks were also made by R.A.A.F. Lincolns, and R.A.F. Brigands, Vampires and Sunderlands. Valettas based at Kuala Lumpur, and Australian Dakotas from Changi, dropped more than 200,000 lb of supplies on 123 dropping zones. Helicopters made 80 casualty evacuations from jungle clearings. More than the usual number of photographic reconnaissance and leaflet sorties were made, and aircraft equipped with loud-hailers—used to induce fleeing terrorists to surrender—had what is described as an extremely successful month of operations.

"Interceptions" Over Singapore

AMERICAN and British forces have been combining for exercises in the Singapore area. U.S.A.F. Superforts from Clark Field in the Philippines were to be intercepted by Hornets and Vampires before landing at the end of their 1,500-mile flight to Singapore. Brigadier-General John W. Sessums, commander of the U.S. 13th Air Force, was invited to fly to Singapore independently as the guest of Air Marshal Sanderson, C.-in-C. British Far East Air Force. The American aircraft were due to take off from Changi on their return flight last Wednesday.

Fiji Anti-Submarine Exercises

THE series of anti-submarine exercises, lasting a week, held recently off Viti Levu Island, Fiji, are reported to have been successful. R.N.Z.A.F. flying-boats took part, together with H.M. submarine *Thorough*.

Early next year, women members of the R.N.Z.A.F. are to be permitted once more to serve on Fiji. They are to be stationed at Lauthala Bay, and some twenty posts will be filled early in 1953.

Pensions Motion Tabled

AN all-party motion has been tabled in the House of Commons by about 130 members, urging an increase in retired pay for officers whose services ended before September 1st, 1950. The cost of raising all pensions to the rates paid to officers retiring after September, 1950, would be more than £2 million in the first year. It may be recalled that Lord Ogmore led an all-party delegation from both Houses which saw the Minister of Defence on this subject last July.

An "Eagle" Appointment

EARLY in January, Commander N. G. Hallett, D.S.C. and Bar, R.N., is to relieve Cdr. N. K. Cambell, M.B.E., D.S.C., R.N., as Commander (Air) of H.M.S. *Eagle*.

Cdr. Hallett, who is 39, joined the Navy as a cadet in 1926 and started flying in the Fleet Air Arm in 1935. His distinguished war service began in H.M.S. *Furious* and H.M.S. *Ark Royal* when he served as a fighter pilot with 807 Squadron, flying Fulmars. He was awarded the D.S.C. for his work in one particularly hard-fought Malta convoy battle in 1942. In 1944 he commanded No. 3 Naval Fighter Wing and later commanded No. 24 Naval Fighter Wing in H.M.S. *Indefatigable*, operating with the British Pacific Fleet. For his part in air operations against Japan he was awarded a Bar to his D.S.C.

New C.O. for No. 612

NO. 612 (City of Aberdeen) Auxiliary Squadron has recently said goodbye to its Regular C.O., S/L. G. W. Cory. He has been with the Aberdeen Squadron since November, 1950, but has now been appointed S.A.S.O. at Air Headquarters, Hong Kong, with the rank of Wing Commander. In his place a member of the squadron, F/L. (now S/L.) Nigel McLean, has taken over as C.O. S/L. McLean, who is 30 years old, learned to fly with the Fleet Air Arm in 1940 and later served in armed merchant ships as pilot of the aircraft catapulted from their decks. Towards the end of the war he served in the Pacific with the American Third Fleet. It is four years since the City of Aberdeen Squadron was commanded, as is the tradition, by an Auxiliary pilot.

New Zealand Air Force Act

A MOST important step was taken in the history of the R.N.Z.A.F. a few weeks ago, when the Royal New Zealand Air Force Act, 1950, was brought into force. When, by the Air Force Act of 1937, the R.N.Z.A.F. was established as a separate force, it had no disciplinary code, regulations or orders of its own, and the task of writing them was held up by the war. Now, in place of *Queen's Regulations and Air Council Instructions*, a volume of *Air Board Orders* has been written. A New Zealand edition of the *Manual of Air Force Law* is being prepared, and will be issued in sections during the next year or two.

THE C.A.S.-DESIGNATE, Air Chief Marshal Sir William F. Dickson, arrived home recently on completion of his world tour. He had flown from Washington, D.C., to Ottawa, and finally to London Airport, where he is seen disembarking from B.O.A.C.'s "Canadian Monarch."

Charter for R.A.F.A.

THE grant of a charter of incorporation to the R.A.F. Association has been approved by Her Majesty the Queen, Patron of the Association.

Harvards Back in Harness

TO provide for larger aircrew intakes and the proposed build-up of fighter and ground-attack squadrons in the R.N.Z.A.F., 40 Harvards which were held in reserve are being modernized and returned to service.

Benevolent Fund Finances

THE finances of the Royal Air Force Benevolent Fund are causing concern. The Controller, A.V-M. Sir John Cordingley, stated recently that the Fund spent £564,617 on helping serving and ex-Service R.A.F. and W.R.A.F. personnel and their dependants. Expenditure had increased by 3½ per cent, but the Fund's total income had decreased by 17½ per cent. The number of cases helped had risen to a total of 21,164. The Fund had been compelled to realize investments totalling £226,652 to meet expenditure. Sir John said that the Fund would inevitably fail to carry out its aims and objects in 1975-80, when the men who

CONTINUOUS EFFICIENCY: For the second year in succession the A.O.P. Efficiency Trophy has been won by No. 663 A.O.P. Squadron, R.Aux.A.F. Major C. Surgeon, R.A., is seen receiving the trophy from General Sir Cameron G. G. Nicholson, G.O.C. Western Command, at Hooton Park, Cheshire.

SERVICE AVIATION . . .

won World War II in the air will be in need of assistance—perhaps for the first time—in their old age, if the public response to the Fund's appeal was not adequate.

Canadian Visitors

AFTER having been delayed by the week-end fog, the Canadian Defence Minister, Mr. Brooke Claxton, and Air Marshal W. A. Curtis, the retiring Canadian C.A.S., visited No. 1 Fighter Wing R.C.A.F. at North Luffenham on Tuesday of last week. They flew up from Northolt in an R.C.A.F. Dakota.

The weather was too bad to allow either for the Dakota to be met by escorting Sabres or for the projected aerobatic display by the team from No. 410 Squadron.

No. 1 Wing paraded for inspection in No. 2 Hangar and was addressed by the Defence Minister. Referring to the General Salute having been played by the Wing pipers wearing kilts, Mr. Claxton said that he would not be surprised if one day he found himself being piped aboard his aircraft by bosuns' pipes. He congratulated the Wing on its smart turnout and said that they would be pleased to know that in Exercise Ardent they had been the most successful unit in the matter of interceptions.

He announced, also, an arrangement whereby any member of the Wing could travel to any part of Britain for a flat rate of 3 dollars 83 cents.

Before leaving the dais to inspect the station, he congratulated G/C. Hale, who commands No. 1 Wing, on the award of the American D.F.C. for his service in Korea.

Speaking in the officers' mess after lunch, Mr. Claxton said that the Wing would remain at North Luffenham until 1954, when it would move to Gravelines in France. Production of aircraft in Canada, he said, had beaten every target date. The first of 300 or 400 Canadair-built Sabres for the R.A.F. had been delivered and the CF-100 was now just going into service.

Air Marshal Curtis, who spoke after the Defence Minister, said that North Luffenham was the only station he had visited during the past year where he recognised the same faces. The units in Canada were screaming about men being taken from them, but such movements were necessary because of Canada's world-wide commitments.

He said that pilots returning to Canada after the end of this year would go to CF-100 squadrons, and that the CF-100 had been flown up to a Mach number of 0.98—"but with the heavier engine will do better; I tell you that because I want you to know that the CF-100 is coming up to our highest standards."

Mr. Brooke Claxton is in Europe to attend the tenth meeting of the NATO Council of Ministers in Paris. On December 13th he was present at the official opening ceremony of the Royal Canadian Air Force base at Gros Tenquin in France, where No. 2 Fighter Wing is stationed and forms part of No. 4 Allied Tactical Air Force.

This ceremony also included the official handing over of Nos. 416, 421 and 430 Fighter Squadrons, which comprise the No. 2 Fighter Wing, to Supreme Headquarters Allied Powers in Europe.

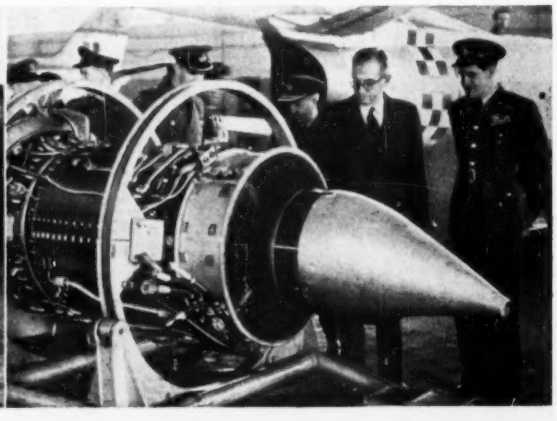
The programme was somewhat spoiled by bad weather, which prevented both the French air force and the Canadian squadron stationed at North Luffenham from participating. During the previous night a gale gusting up to 75 m.p.h. had done considerable damage to the somewhat incomplete buildings of the station.

At Gros Tenquin France was represented by the Defence Minister, M. René Pleven, and the Wing was accepted by General A. M. Gruenther on behalf of SHAPE. General G. P. Vanier, Canadian Ambassador to France was present but the Secretary General of NATO, Lord Ismay, was unable to attend.

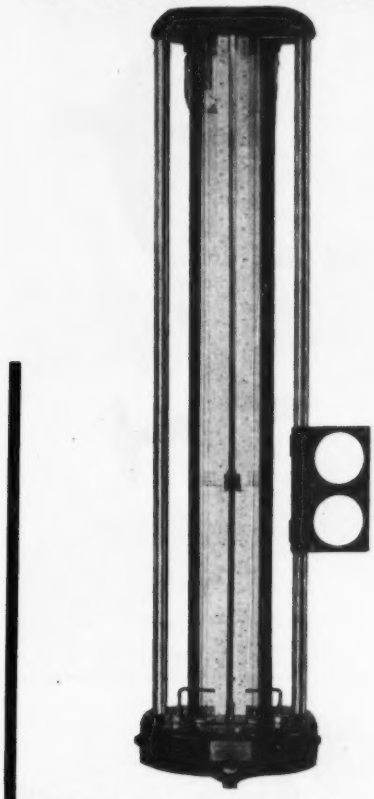
Air Marshal W. A. Curtis, R.C.A.F., who had intended travelling with Mr. Brooke Claxton, unfortunately had to be hurried to the R.A.F. hospital at Uxbridge where an emergency operation was performed.

THE BLAZED TRAIL: A.V-M. D. A. Boyle, leader of the R.A.F. goodwill mission to Latin America, shows Sir George Nelson the route travelled by the English Electric Canberras. The occasion was a reception at Londonderry House (see page 750) in honour of the Bomber Command aircrews.

CANADIAN INSPECTION: Mr. Brooke Claxton, the Canadian Defence Minister, recently visited No. 1 Fighter Wing, R.C.A.F., at North Luffenham Rutlandshire. He is seen (left) inspecting the Guard of Honour—under the command of F/L. D. Webb—and a General Electric J-47 turbojet awaiting installation in one of the Wing's Sabres (see "Canadian Visitors"). "Flight" photographs



THE MASTER A.S.I. CALIBRATOR



Special Features :—

- A cursor with line sighting to eliminate parallax errors.
- Floats with sighting discs clear of liquid.
- A patented push-button selector to ensure instantaneous change-over from water to mercury.
- Anti-spill liquid traps.
- Quick release glands for dismantling and replacing tubes.

Also available :—*Gyro Instrument Test Tables (Electrically or Air Operated Instruments). Low Pressure Chambers. Pressure Gauge Testers. Luminosity and Fluorescent Comparators. Thermometer Testers. Stroboscopic Testers.*

BRYANS AEROQUIPMENT LIMITED

Willow Lane · Mitcham Junction · Surrey

Telephone: MITcham 1607-8-9

THE

Bristol

AEROPLANE COMPANY LIMITED

have the following

VACANCIES

FOR

TECHNICAL ASSISTANTS

in the

Aircraft Design Technical Office:—

A A Senior Technical Assistant for **WEIGHT ESTIMATING AND WEIGHT CONTROL AT FILTON.**

B An Intermediate Technical Assistant for **WEIGHT ESTIMATING AND WEIGHT CONTROL IN THE LONDON DESIGN OFFICE.**

Qualifications required are some experience in similar work, particularly for the senior post, and a Higher National Certificate or equivalent academic standard in aeronautical or mechanical engineering.

C Intermediate Technical Assistants for **STRUCTURAL DESIGN** analysis at Filton.

First-class academic qualifications are required, preferably an Honours Degree in Engineering, or the Diploma of the College of Aeronautics. Some experience in an aircraft design office on similar work is preferred.

★

The Company has a wide range of designs in progress, including large civil aircraft, helicopters and advanced new military projects. Salaries, working conditions and prospects of promotion on merit are excellent.

Facilities for subsidized private flying are provided at Filton.

Applications should be addressed to the Personnel Manager, Bristol Aeroplane Company Limited, Aircraft Division, Filton House, Bristol.

In the air . . .

Cookers · Motors · Generators · Radio equipment · Refrigerators · Heating and Ventilation · Lighting fittings · Stewards' call systems · Heavy alloy · Aircraft cables · Osram lamps · etc.

G.E.C. ELECTRICAL EQUIPMENT FOR AVIATION

. . . on the ground

Airport lighting and control · Ground traffic control · Power equipment and cables · Radio communication · Navigational aids · Broadcast call systems · Telephone communication · Lighting fittings · Heating and Ventilation · Cooking equipment and any other type of electrical equipment for airport buildings · Osram lamps · etc.

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

THE

Bristol

AEROPLANE COMPANY LIMITED

has the following

VACANCY

for a

TECHNICAL ASSISTANT

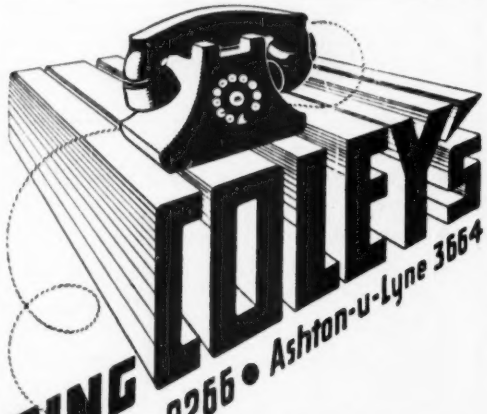
in the Aircraft Design Drawing Office:—

Technical Assistant, with engineering degree, for design and development of PRESSURISING AND AIR-CONDITIONING SYSTEMS, including thermal and acoustic insulation and heat exchangers.

Some flying experience desirable.

The Company has a wide range of designs in progress, including large civil aircraft, helicopters and advanced new military projects. Salaries, working conditions and prospects of promotion on merit are excellent. Facilities for subsidized private flying are provided at Filton.

Applications should be addressed to the Personnel Manager, Bristol Aeroplane Company Limited, Aircraft Division, Filton House, Bristol.



COLEY'S

RING HOUnslow 2266 • Ashton-u-Lyne 3664

FOREMOST

SCRAP METAL

MERCHANTS TO THE AIRCRAFT INDUSTRY

BUYERS OF ALL GRADES OF FERROUS AND NON-FERROUS METALS—ALSO OF ALL KINDS OF REDUNDANT STOCKS

COLEY METALS LTD.

INCORPORATING

IN THE SOUTH ● R. J. COLEY & SON (HOUNSLOW) LTD., JUBILEE WORKS, CHAPEL ROAD, HOUNSLOW, MIDDLESEX

IN THE NORTH ● R. J. COLEY & SON (NORTHERN) LTD., PARK WORKS, KING STREET, DUKINFIELD, CHESHIRE

Safety in the Mines

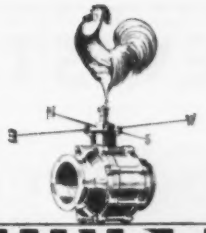
For generations the homely canary has contributed to safety in the mines. In the air protection against fire is a more complex problem . . . and no single organisation has contributed so much to its solution as Graviner. Today, whilst happily called into use very rarely, Graviner systems, by their high degree of reliability, nevertheless play an important part in maintaining crew and passenger confidence. Continuous research into new and improved methods of fire detection and fire fighting ensures that new British aircraft now under construction will embody the highest degree of protection.

Safety in the Air

GRAVINER

Airborne **FIRE PROTECTION EQUIPMENT**

THE GRAVINER MANUFACTURING CO. LTD.
POYLE MILL WORKS, COLNBROOK, BUCKS. *Tel.* Colnbrook 48
G.R.2



SAUNDERS
AERO
COCKS

FITTED IN BRITAIN'S FOREMOST AIRCRAFT INCLUDING

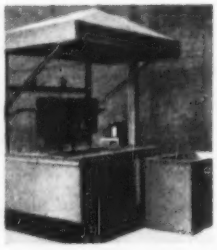
171	173
DOVE	FURY
COMET	HERON
HERMES	BALLIOL
HUNTER	ATHENA
BRIGAND	HASTINGS
CANBERRA	MARATHON
BRABAZON	BRITANNIA
AMBASSADOR	SHACKLETON
UNIVERSAL	FREIGHTER
WAYFARER	FREIGHTER
PRINCESS	WYVERN
VAMPIRE	LINCOLN
GANNET	METEOR
VENOM	PRINCE
SRAI	HPR2
S51	S52

SAUNDERS VALVE COMPANY LIMITED

Aircraft Division

CWMBRAN, MONMOUTHSHIRE, ENGLAND

"NEWSTAD"



HEAT TREATMENT FURNACES
for
LIGHT ALLOYS
or
STEEL

SALT BATHS
and
AIR RECIRCULATION FURNACES

MODERN FURNACES & STOVES LTD.
BOOTH ST., HANDSWORTH, BIRMINGHAM 21
Telephone: SMEthwick 1591-2. Telegrams: MOFUSTOLIM, B'HAM 21

THE SUPERMARINE WORKS
of
VICKERS-ARMSTRONGS LTD.
HURSLEY PARK, WINCHESTER
require design staff for work on high-performance aircraft.

DRAUGHTSMEN
Mechanical
Structural
Electrical
Full-scale Layout
Rig Testing

TECHNICAL ASSISTANTS
for
Structural Calculations
Structural Testing
Flight Test Aerodynamics
Flight Test Instrumentation
Electronics
Thermodynamics

Previous aircraft experience not essential.

Pension Scheme

Excellent transport facilities.

Apply, stating experience, age and salary required, to :
PERSONNEL MANAGER
HURSLEY PARK, NR. WINCHESTER, HANTS.

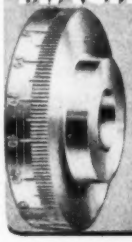
May Christmas
be Merry,
and the New Year
be Prosperous,
is our wish
to our many
Aviation friends
throughout the world

from the firm of

RUMBOLD

AIRCRAFT SEATING SPECIALISTS
KILBURN, LONDON, N.W.6
MAIda Vale 7366

All classes of
MACHINE ENGRAVING
from
SIMPLE DIALS
to
INTRICATE DIES



JOHN MEERLOO & SONS LTD.
74 LONDON RD., KINGSTON-ON-THAMES
ON A.I.D. APPROVED LIST NO. 4362/50

FREE **A VALUABLE BOOK**
which details the wide range of Engineering and Commercial Courses of modern training offered by E.M.I. Institutes—*the only Postal College which is part of a world-wide Industrial Organisation.*

Courses include training for:
A.F.R.Ae.S. Examinations, M.C.A. Aircraft Radio Maintenance Certificate; A.R.B. Aircraft Engineers' Licences; General Training courses in Aeronautical Engineering; P.M.G. Certificate, also courses in all Branches of Engineering.

EMI Institutes
associated with
MARCONIPHONE COLUMBIA HMV
COURSES FROM £1 PER MONTH

POST NOW
Please send, without obligation the FREE book
E.M.I. Institutes, Dept. 123
43 Grove Park Rd., Chiswick, London, W.4
Name .....
Address .....
.....BC.10X

FLIGHT
and
AIRCRAFT ENGINEER

PRESS DAY — *Classified advertisement "copy" should reach Head Office by* FIRST POST THURSDAY *for publication in the following week's issue subject to space being available.*

CLASSIFIED ADVERTISEMENTS

Advertisement Rates. 4/- per line, minimum 8/-, average line contains 6-7 words. Special rates for Auctions, Contracts, Patents, Legal and Official Notices, Public Announcements, Tenders 5/- per line, minimum 10/-. Each paragraph is charged separately, name and address must be counted. All advertisements must be strictly prepaid and should be addressed to FLIGHT Classified Advertisement Dept., Dorset House, Stamford Street, London, S.E.1.

Postal Orders and cheques sent in payment for advertisements should be made payable to Iliffe & Sons, Ltd., and crossed & Co.

Trade Advertisers who use these columns regularly are allowed a discount of 5% for 13, 10% for 26 and 15% for 52 consecutive insertion orders. Full particulars will be sent on application.

Box Numbers. For the convenience of private advertisers Box Number facilities are available at an additional charge for 2 words plus 1/- extra to defray the cost of registration and postage, which must be added to the advertisement charge. Replies should be addressed to "Box 0000, c/o Flight," Dorset House, Stamford Street, London, S.E.1.

The Publishers retain the right to refuse or withdraw advertisements at their discretion and do not accept liability for delay in publication or for clerical or printer's errors although every care is taken to avoid mistakes.

Situations Vacant. The engagement of persons answering these advertisements must be made through the local office of the Ministry of Labour and National Service etc. if the applicant is a man aged 18-64 or a woman aged 18-59 inclusive, unless he or she or the employer is excepted from the provisions of The Notification of Vacancies Order 1952.

A. V. ROE & Co. LTD

have vacancies for

TECHNICIANS

AT WOODFORD AERODROME CHESHIRE

POWER PLANT SECTION

Technicians are wanted for work on fuel and engine installation test rigs. Previous experience essential.

WIND TUNNEL

Technical staff are required to assist in the design and operation of a Transonic Wind Tunnel.

FLIGHT TEST AERODYNAMIC SECTION

Technicians are required for Flight Aerodynamic Investigation. Previous experience essential.

FLIGHT TEST PLANNING SECTION

Technicians are required with experience of development and Contractor's trials.

Applicants for the above vacancies should have obtained Higher National Certificate or equivalent.

GOOD SALARIES & PROSPECTS
PENSION & LIFE ASSURANCE SCHEME

Apply, giving age, qualifications and experience, to:—

CHIEF DESIGNER
A. V. ROE & CO. LIMITED
GREENGATE · MIDDLETON
MANCHESTER

AIRCRAFT SPRING WASHERS

TO B.S. SPECIFICATION S.P.47

CROSS MFG. (1938) LTD., COMBE DOWN, BATH

PRESS NOTICE

JANUARY 2nd Issue will close for Press with FIRST POST, DECEMBER 23rd.

AIRCRAFT FOR SALE

W. S. SHACKLETON, Ltd., 175, Piccadilly, London, W.1, have a Christmas message . . .

LOOKING up for a moment from our typewriter, we notice with stark horror that another Christmas is practically at our throats!

IT is not that we are against it for a moment—but simply that things are apt to become disorganized in the world at large, and like other human beings we become confused with the paraphernalia of Yuletide. We have robins and stage coaches and good brown ale and genial landlords and holly and port and Stilton cheese and completely-overhauled-nil-hour-Gipsy Majors and robins and stage coaches and . . .

SOMEHOW we manage to rise above it and take things in our stride—this is the 21st Christmas since Horace, our Tame Streeman, joined the firm. With a paper hat on his head and a jovial smile on his face he continues to deal with enquiries of every description from every corner of the globe . . . Gaskets for Galapagos, fuel pumps for Fiji, a tail-skid for Mbatu, a Hendy Heck for the Hebrides, a Proctor for Hong Kong, 178 Skymasters-for-a - Government - on - behalf - of - a - gentleman - in - Hampstead - whose - name - I - could - not - quite - catch . . . TO ALL OUR FRIENDS WE SEND OUR SINCERE GOOD WISHES FOR CHRISTMAS.

LET us now lay aside the hum-drum pattern of the conventional aeroplane advertisement thus:—

£X,XXX TAYLORCRAFT Plus D, without a new C. of A., fitted with completely expired Incomplete Cirrus Minor I engine. A.R.B. condemned, fabric painted contrary to customer's requirements. All ready to go with carefully perished tyres. The perfect aircraft for the . . . to do what he/she . . .

and in accordance with other international commerce houses in this heart of the Empire, suggest to the philanthropic fathers of enthusiastic sons in all parts of the world for Christmas 1952

"BUY THE LAD AN AEROPLANE!"

W. S. SHACKLETON, Ltd., 175, Piccadilly, London, W.1. Tel.: Regent 2448/9. Cables: "Shackhud, London." [0070

R. K. DUNDAS, Ltd.

Have the following machines available for sale:—

HEAVY TRANSPORT CATEGORY

One DC-4 in excellent condition.
Three Dakotas, low hours and long-term Cs. of A.
Ten Catalinas (not amphibious), engine hours nil in some cases. Long-term Cs. of A.

MEDIUM TRANSPORT CATEGORY

One Dove in excellent condition.
Two Anson Is completely overhauled.
Eleven Rapides, six with nil hours on engine (1,000 hours life) and completely overhauled.
Eight Consuls available, six completely overhauled with nil-houred engine.
Two Aerovans, both with long-term C. of A. and in excellent condition.

LIGHT TRANSPORT CATEGORY

Two Geminis, one with long-term C. of A., both in excellent flying condition.
Five Proctor Variants.
Two Messengers available, fitted with Gipsy Major 1D engines with low hours.
Two Fairchild Argus with low engine hours. Technically sound machines.

TRAINING AND LIGHT AIRCRAFT

Eleven Auster Variants, all in good condition.
Any number of Tiger Moths available, completely overhauled and fitted with nil-houred engines.
Two Moth Minors available, one with nil-houred engine, fully aerobatic, and long-term C. of A.

THIS WEEK'S SPECIAL OFFER

CESSNA 140, engine hours 225 since new, and offered with 12 months C. of A. Fitted with blind-flying panel, navigation and landing lights, starter and metal propeller. Can be supplied with floats and skis.
The above aircraft are for immediate sale and inspection will be arranged promptly.
For full details, apply to:

R. K. DUNDAS, Ltd.
29, Bury Street, St. James's, London, S.W.1. Cables: "Dundassero, Piccy, London." WHI. 2648.
CROYDON Airport. CRO. 7744. [0559

ROLLASON'S

HAVE
DAKOTAS, DOVES, CONSULS, RAPIDES, GEMINIS, AUSTERS, PROCTORS, MAGISTERS AND TIGER MOTHS

At highly competitive prices

For Sale

Also innumerable
GIPSY MAJORS, QUEEN IIs & IIIs
CHEETAH IXs & Xs and
P. & W. RANGE
AERO ENGINES

A.R.B. released spares for the above for immediate delivery

Also Tyres, Tubes, Instruments, Batteries, Bulbs, Seats, Fabric, Plywood, Perspex, Plugs, Magnetos—in fact for everything aeronautical

Write to:—
W. A. ROLLASON Ltd. &
ROLLASON ENGINES Ltd.
CROYDON AIRPORT, SURREY
Tel.: CROydon 5151/4
Cables: ROLLAIR, CROYDON

FLYING EQUIPMENT

R.A.F. FLYING GAUNTLETS

As illustrated. Complete with white silk undergloves. **42/6**

Genuine Natural SHEEPSKIN GLOVES lined throughout with genuine wool. Sac wrist. Excellent dooing or flying glove. **26/6**

GOSPORT TUBES, specially designed replacement of 6F/154 (suitable for R.A.F. patt. Flying Helmets) **24/3.**

Second-hand **FLYING JACKETS** wanted. Good prices paid. Call or write.

Terms to Flying Clubs. Trade Supplied. Send 3d. in stamps for illustrated catalogue.

D. LEWIS LTD. (Dept. F)
Leather Clothing Manufacturers for Home or Export
124 GT. PORTLAND ST., LONDON, W.1
Tel.: Museum 4314. Grams: Aviskit, Wesdo, London

AIRCRAFT FOR SALE

£5,000 Auro 19 Series 2, 6-seater Executive model. Full 12 months C. of A. Dual control. Metal wings and tailplane, radio T.R.1154/55, 1143A, S.B.A. Type R.R.2. With new airframe and engine hours. WOLVERHAMPTON AVIATION, Ltd. Tel.: Fordhouses 2238. [0025

AUSTER J4 (Arrow) in really first-class condition. Airframe and engine hours less than 200 since new C. of A. until August, 1953. Attractively finished in red with red leather interior. Immediate delivery. £495.—Lotham & Fiying Services, Ltd., Squires Gate Airport. [0001

STINSON RELIANT 5-seater aircraft, full dual control, radio, navigation lights, now undergoing extensive C. of A. Finished in colours to suit purchaser. Make ideal charter aircraft. £975.—Keystone Garage, Ltd., Exeter Road, Bournemouth. [0017

£600—AUTOCRAT J.1 three-seater, under 680 hours since new in 1946. Full C. of A. to August 7, 1953, 22 hours since renewal C. of A. Dual control, finished cream-red. Exceptional condition.—Capt. Cruickshank, 519 Wells Road, Knowle, Bristol 4. Phone 77126. [0026

AIRCRAFT WANTED

AEROSERVICES (LONDON) LIMITED

Are still looking for a good CONSUL, with or without C. of A.

Write, telephone or cable—

95, HERTFORD STREET, PARK LANE, LONDON, W.1.

Tel.: GRosvenor 8383.

Cables: Aerojaul, London. [0040

PROCTOR V. Low hours, current C. of A. Cash waiting. Write or phone Holmwood Hotel, First Avenue, Westcliff-on-Sea. Southend 49561. [0018

OUR demand for good used aircraft of all descriptions is very great. Operators or owners wishing to dispose of aircraft, engines, or anything aeronautical, are asked to communicate at once to—

R. K. DUNDAS, Ltd., 29, Bury Street, London, S.W.1.

WHI 2648. Cables: "Dundasaero, Piccy, London."

RWC CROYDON AIRPORT. CRO. 7744. [0036

AIRCRAFT ACCESSORIES AND ENGINES

RAPIDE spares: a large quantity kept in stock. Inquiries to Air Stores (Gatwick), Surrey. Tel.: Horley 1510, ext. 109. Night: Farnborough (Kent) 3303. [0012

FOUR Hose 10.0000 "Flylite" No. 4, 11in bore, new condition.—H. H. Bradford, Ltd., Ramsey, Harwich, Essex. [0041

VENDAIR, Croydon Airport, advise all operators and agents requiring aircraft engine spares or ancillary equipment, British or American, to write or phone Sales Dept., Vendair, Croydon Airport, Croydon 5777. [0006

AIRCRAFT SERVICING

BROOKLANDS AVIATION, Ltd., Brooklands Aerodrome, Weybridge. C. of A. overhauls, modifications and conversions. Tel.: Byfleet 436. [0027

CRACK detection by Magna Flux. A.R.B. Certificate of Compliance coverage for aircraft parts. Prompt services, reasonable charges.

C. AND S. AIRCRAFT, Blackbushe Airport, Camberley. C. 1000 (Extn. 307). [0010

REPAIRS and C. of A. overhaul for all types of aircraft. Brooklands Aviation, Ltd., Civil Repair Service, Sywell Aerodrome, Northampton. Tel.: Moulton 3218. [0007

CARAVANS

A CARAVAN "CERT"!

THE certainty of U.K.'s largest selection, of a good site through Caravan Residents' Association, of the unconditional free-van for a faulty one-guarantee, of free rail fares if van bought, £25 deposit lent, better h.p. terms. All branches open seven days a week. So why not send for free brochures and advice articles to Dept. F, Taplow please.—A. S. Jenkinson, Ltd., equal selection London branch, 80, Oxford Street, London, W.1. Tel.: Langham 5626. Two minutes Tottenham Court Road Tube. Also Bath Road, Taplow, Bucks. Tel.: Maidenhead 1434. At Right on main A4, Taplow station 4 mins. 37-39, Hammersmith Bridge Road, W.6. Tel.: Riverside 3141. 1 min. to Hammersmith Broadway. [0509

NEW Statesman £1,065. Other Berkeleys from £595.10/-. New Glider 4-berth de luxe, £399.10/-, and 2-berth, £312. Safari, £368. Towing. Hire purchase. Mantles Garages, Ltd., Biggleswade. Tel. 2113. [0067

CLOTHING

R.A.F. and R.N. officers' uniforms purchased, large selection of R.A.F. officers' kits for sale, new and reconditioned.—Fisher's Service Outfitters, 85-88, Wellington St., Woolwich. Tel.: Woolwich 1055. [0067

CLUBS

REDHILL FLYING CLUB, Redhill Aerodrome, Surrey, for instruction.—Nutfield Ridge 2245/3234. [0048

HERTS and ESSEX AERO CLUB, Broxbourne Aerodrome, Nazeing, Essex. M.C.A. approved 30-hour course, solo flying from 30/- per hour; residential; trial lessons, 35/-; train from Liverpool Street, or Green Line Coach 715. Tel.: Hoddesdon 2453, 2421, 3075. [0230

CONSULTANTS

R. W. SUTTON (CONSULTANTS), Ltd., 7, Landsdown Place, Cheltenham. Tel. 5611. [0750

WING COMMANDER R. H. STOCKEN, F.R.Ae.S., Eagle House, 109, Jermyn St., London, S.W.1. Tel.: Whitehall 8905. [0419

CANADA-U.K. Britain's Liaison service. Technical and Sales. Personal contact.—W. P. Dunphy, Consulting Air Engineer, Montreal Airport, Montreal, Canada. [6340A

HANGARS

STANDARD STEEL HANGARS

HANGAR (all steel) 131ft overall; span x 150ft to 250ft long, clear opening 119ft 6in wide x 27ft 6in high. Doors both ends (gable end optional). Covered asbestos or steel sheets. Glazing in sides.

HANGAR (all steel) 212ft 6in overall span x 150ft to 250ft long, clear opening 200ft wide x 40ft high. Doors both ends (gable end optional). Covered asbestos or steel sheets. Glazing in roof and sides. 20ft span annexes on one or both sides if required.

ROMNEY HUTTS. Suitable for airfield stores or offices. Curved buildings 30ft span, covered corrugated steel sheets. Ends as required; ex stock.

BELLMAN HANGARS, LTD.,

TERMINAL HOUSE, GROSVENOR GARDENS, LONDON, S.W.1.

Grams: Unitstruct, Sowest, London. [0080

1½D

PER PASSENGER MILE is the low direct operating cost of the

SO-30P BRETAGNE airliner, according to standard costing methods.

A very fair figure indeed for a 40-seater, 1,000 mile pressurized airliner with so many other points in its favour!

One of these points is the exceptionally good delivery offered by the

BRITISH COMMONWEALTH AGENTS & CONCESSIONAIRES

AEROCONTACTS LIMITED

who will be pleased to send fullest details upon request.

HANGARS

STEEL hangar, 27ft long by 25ft wide, full width swing doors. Lately housed folded Miles Falcon. £90 as lying, Herts.—Tel.: St. Albans 1311. [0026

PACKING AND SHIPPING

R. AND J. PARKS, Ltd., 143-9, Fenchurch St., E.C. Tel.: Mansion House 3083. Official packers and shippers to the aircraft industry. [0012

PUBLIC ANNOUNCEMENTS

AIR TRANSPORT ADVISORY COUNCIL

THE Air Transport Advisory Council give notice that they have received the undermentioned applications to operate scheduled air services:—

APPLICATION No. 126 from Silver City Airways, Ltd., of 1, Great Cumberland Place, London, W.1, for a Vehicle Ferry service, initially with Bristol 170 aircraft and later with Blackburn Universal aircraft, for the carriage of vehicles, passengers and supplementary freight between London (Gatwick) and Le Touquet, at a frequency of from two to three services daily (April to September) during 1953-54 and thereafter up to one service hourly, during the period from April 1st, 1953, to March 31st, 1963.

APPLICATION No. 127 from British Overseas Airways Corporation, of Airways House, Brentford, Middlesex, for the inclusion of a traffic stop at Kano on their normal scheduled services on the route London-Tripoli-Kano-Lagos-Accra, during the period from January 1st, 1953, to December 31st, 1959.

THESE applications will be considered by the Council under the terms of reference issued to them by the Minister of Civil Aviation on July 30th, 1952. Any representations or objections with regard to these applications must be made in writing, stating the reasons, and must reach the Council within 14 days of the date of this advertisement, addressed to the Secretary, Air Transport Advisory Council, 9 Buckingham Gate, London, S.W.1, from whom further details of the applications may be obtained. When an objection is made to an application by another air transport company on the grounds that they are applying to operate the route or part of route in question, their application, if not already submitted to the Council, must reach them within the period allowed for the making of representations or objections.

THE Council also give notice that Application No. 8 from British European Airways Corporation, of Keyline House, Ruislip, Middlesex, for a Colonial Coach service between London and Malta with D.C.3 Pionair and Viking aircraft, which was advertised in "The Times," "The Aeroplane" and "Flight" on September 5th, 1952, has now been withdrawn. [0044

TUITION

"AVIGATION OF EALING"

HAVE you got your Civil Pilot's Licence? NOW is the time to study, either by personal postal means or by attending at our lecture premises. Vacancies for first-class tuition very limited owing to heavy bookings. Apply immediately.

WE do not have to live on an old reputation as we are building a new one day by day. Our students' successes and our methods have proved themselves the foremost in the country.

OBTAIN free details and prospectus from "AVIGATION LTD.," 30, Central Chambers, EALING, W.5 (opposite Ealing Broadway Underground Station). Tel.: Ealing 6949. [0248

TWIN CONVERSIONS

GEMINI aircraft, fitted radio, £6 per hour, dual or solo. Southend Flying School, Essex. Rochford 99204. [0046

AIR SERVICE TRAINING OF HAMBLE, provides training in all branches of aviation in their flying, navigation, radio and engineering schools.

DETAILS of the numerous "ab initio" and conversion courses available will be forwarded on application to the Commandant, Air Service Training, Ltd., Hamble, Southamp'n. [0076

LEARN to fly for £24; instructors' licences and instrument flying for £3 an hour; night flying £3/10/- an hour; residence 5 gns. weekly. Approved M.C.A. private pilot's licence course. Wiltshire School of Flying, Ltd., Thruxton Aerodrome, Andover, Hants. [0253

A.F.R.Ae.S., A.R.B.Certs., A.M.I.Mech.E., etc., on "no pass no fee" terms; over 95% successes. For details of exams and courses in all branches of aeronautical work, navigation, mechanical eng., etc., write for 144-page handbook free. B.I.E.T. (Dept. 702), 17, Stratford Place, London, W.1. [0707

AERONAUTICAL, automobile or agricultural engineering. Practical full-day workshop training with graded technical courses for students with or without G.C.E. Short pre-call up or refresher courses. Syllabus from Engineer in Charge, College of Aeronautical Engineering, Sydney Street, Chelsea. Flaxman 0021. [0019

COMMERCIAL pilots' licences, technical "General" and type-ratings, conversions, personal instruction. Five-day full-time course for specific type. Special arrangements for urgent requirements. Syllabus from Pilot, College of Aeronautical Engineering, Sydney Street, Chelsea. Flaxman 0021. [0020

FREE! Brochure giving details of courses to all branches of aero. eng., covering A.F.R.Ae.S., A.R.B.Certs., M.C.A. exams., etc. We are the only postal training college operated by an industrial orvanization. Write to E.M.I. Institutes, Postal Division, Dept. 726, 43, Grove Park Road, London, W.4. (Associated with H.M.V.) [0028

SOUTHEND-ON-SEA MUNICIPAL FLYING SCHOOL, Essex. Tel. Rochford 99204. Comprehensive training for private, commercial licences and instructors' endorsements. M.C.A. approved for 30-hour course. Tiger Moth and Auster aircraft fitted with radio. Special facilities for training in instrument ratings. Hourly rates: solo, day £3, night £4. Dual 5/- extra. Contract rate £2/10/-. Link trainer 10/-. No fees or subscriptions. Trial lesson 30/-. [0032

AIR SERVICE TRAINING of Hamble offer a refresher course in preparation for the Commercial Pilot's Licence and Instrument Rating technical examination. Course commences February 2nd, 1953, duration 6 weeks. Fee £45. Full Airline Transport Pilot's Licence course commences January 19, 1953.—For particulars, apply Commandant, Air Service Training, Ltd., Hamble, Southampton. [0047

SITUATIONS WANTED

PILOT, age 28. Commercial licence, R/T Licence, 1,400 hours twins captain. Energetic, recently trained to A.I.T.P. standard. Experienced in Middle and Far East. Position in any country but prefer Far East.—Write Box 4269. [0041

THE
DE HAVILLAND
ENGINE COMPANY LIMITED
have vacancies in their
DESIGN OFFICE at STAG LANE
for
SENIOR DESIGN DRAUGHTSMEN & CHECKERS
for work on Gas Turbine development and other projects
GOOD SALARIES & PROSPECTS
for suitable applicants
SUPERANNUATION SCHEME
for further details write
THE PERSONNEL OFFICER
STAG LANE, EDGWARE
MIDDLESEX

Aero & Jig & Tool Draughtsmen in Great Demand

MEN & YOUTHS

There is an insatiable demand for Aero, Jig and Tool, etc., Draughtsmen and Inspectors. So acute is the present shortage that employers are only too anxious to engage those with no previous practical experience who are able to prepare neat and accurate drawings.

QUALIFY AT HOME—IN SPARE TIME
After brief, intensely interesting study—undertaken at home in your spare time—*YOU* can secure an attractive and interesting post as **Aero-Draughtsman.** Numerous vacancies are also available in **Electrical, Mechanical, Plastics,** etc., branches of Draughtsmanship.

FREE GUIDE
The Free Guide contains 132 pages of information of the greatest importance to those seeking such success compelling qualifications as **A.M.I.Mech.E., A.F.R.Ae.S., A.M.I.P.E., A.M.I.M.T., Gen. Cert. of Educ.,** and **B.Sc.,** etc., also **R.A.F. Entry** (Maths., etc.), together with particulars of our remarkable guarantee of
SUCCESS—OR NO FEE
Write now for your copy of this remarkable publication. It may well prove to be the turning point in your career.

NATIONAL INSTITUTE OF ENGINEERING
(Dept. 427), 148-150, HOLBORN, E.C.1
(South Africa Branch E.C.S.A., P.O. Box 8417, Johannesburg).

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through the local office of the Ministry of Labour and National Service, etc., if the applicant is a man aged 18-64 or a woman aged 18-59 inclusive, unless he or she or the employer is excepted from the provisions of The Notification of Vacancies Order 1952.

HER MAJESTY'S COLONIAL SERVICE

APPLICATIONS are invited for the following posts:—

VACANCIES exist for METEOROLOGISTS in the EAST AFRICAN METEOROLOGICAL DEPARTMENT (CDE 57/88/01). Appointment is on two years' probation to the pensionable establishment with salary, according to experience, in the scale £585 to £1,320. Variable cost-of-living allowance also payable. Age limit 37. Candidates over this age may be appointed on contract terms. Income tax at low local rates; quarters when available at rental of 10 per cent of basic salary; free passages for officer and family up to total cost of three adult fares; leave at 4 to 5 days for each completed month of resident service. Candidates (male) must possess a First or Second Class Honours degree in Mathematics or Physics. Post-graduate experience in meteorology an advantage. Duties include administrative, forecasting and other technical meteorological duties in the principal offices of the Department. Officers liable to serve anywhere in East Africa but will in practice be stationed at Nairobi, Dar-es-Salaam or Entebbe.

A VACANCY exists for an airport manager in Tanganyika (CDE 112/8/02). Candidates, preferably under 45, must have an extensive general knowledge of flying operations, preferably having served as captains of aircraft engaged in civil transport flying and should be competent to take charge of the management of an international airport. They should have considerable administrative experience and the personality and tact necessary to deal with passengers and captains of aircraft as well as with the various officials, agents and staff, who will be working on the airport. Duties will be: Administration of fire and crash services, including payment and training of fire-crews. Marshalling of aircraft on the apron and handling of passengers, luggage, mail, etc. Completion of airport statistics. Collection of landing and other charges. Apportionment of airport concessions and collection of rents. Airport security. Supervision of restaurant, customs, medical and immigration facilities. Supervision of airport concessionaires. Administrative action regarding maintenance, runways, taxiways, buildings etc. Administration, payment, etc. of manual staff employed on cleaning duties at airport buildings. General control of accommodation at the airport buildings. The appointment, which is open to male candidates under 45, is on contract for one tour of 2 to 3 years with initial salary of £1,085 in the scale £1,085-£1,230 per annum plus an emergency allowance of £250 per annum. Gratuity is payable at the rate of £37 10s. for each three months' resident service on satisfactory completion of tour. Quarters at rental of 10 per cent of basic salary. Free passages for officer and family up to cost of three adult fares.

INTENDING candidates should apply, in writing, to the Director of Recruitment (Colonial Service), Colonial Office, Sanctuary Buildings, Great Smith Street, S.W.1, giving brief details of their age, qualifications and experience. They should mention this paper and quote the reference number shown against the post for which application is made. [9028

BLACKBURN AND GENERAL AIRCRAFT LTD. have an extensive and progressive programme of design and development work on
MILITARY AND CIVIL AIRCRAFT
necessitating expansion of the design organization in the following categories:—

AERODYNAMICISTS.
Sound qualifications and experience on aircraft work essential.

STRESSMEN.
Senior and Intermediate grades with sound qualifications and aircraft experience.

TECHNICAL ASSISTANTS.
Flight Test Development Section:
Senior Grade for planning of flight test programmes, flight test observing, and analysis of test results. Good aerodynamic background and previous experience essential.
Mechanical Test Section:
(a) Senior grade with experience of aircraft structural and installational test work.
(b) Intermediate grade. Preferably with experience of aircraft test work, but applicants with a good engineering background will be considered.
Weights Control Section:
Aircraft experience desirable.

DRAUGHTSMEN:—
(a) Senior grade with aircraft experience.
(b) Intermediate grade. Preferably with aircraft experience, but applicants with light structural or mechanical experience will be considered.
(c) Electrical. Aircraft experience desirable.

DESIGN offices are at Brough and Leeds. Salaries will be commensurate with ability and experience, and every consideration will be given to ensure the widest scope for extension of experience and future prospects.
Write to
THE PERSONNEL SUPERINTENDENT,
BLACKBURN AND GENERAL AIRCRAFT, LTD.,
BROUGH, YORKS. [9047

BLACKBURN AND GENERAL AIRCRAFT, LTD have an extensive and progressive programme ahead. We are requiring:—
One WEIGHTS CONTROL ENGINEER for work on aero engines (all types), able to estimate weights from drawings and schemes and to control weight of castings and finished machine parts.
Our Works are at Brough.
SALARY will be commensurate with ability and experience, and every consideration will be given to ensure the widest scope for extension of experience and future prospects.
Write to THE PERSONNEL SUPERINTENDENT,
BLACKBURN AND GENERAL AIRCRAFT, LTD.,
BROUGH, YORKS. [9048

BRISTOL AEROPLANE Co. (Weston) Ltd., Weston-super-Mare, require planning engineers with aircraft assembly, detail or machine shop experience. Must be capable of processing, estimating and rate-fixing.—Applications, giving details of qualifications, experience and age, should be addressed to the Personnel Manager. [9045

FIELD'S

A HUNTING GROUP COMPANY

offer a

DAKOTA FREIGHTER

(Unrestricted Export)

Completely Overhauled

Zero Hours Engines and Props

De-icer System

American Fire Modifications

Standard Radio Equipment

Can be inspected at our Nottingham Unit by arrangement

Early Delivery

PRICE
$75,000
or near offer

Part Payment in Soft Currency Acceptable

Full details available

FIELD AIRCRAFT SERVICES LIMITED
CROYDON AIRPORT · CROYDON SURREY
Phone: CROydon 7777
Cables: FIELDAIR, Croydon

129.112

SITUATIONS VACANT

VICKERS ARMSTRONGS, Ltd. (Aircraft Section), have vacancies at their Hurn Depot for the following staff
DESIGN DRAUGHTSMEN
(aircraft experience preferable but not essential)
AIRCRAFT STRESSMEN
TRACING CHECKER
(Male or female)
APPLY, in writing, to the Employment Manager, Vickers-Armstrongs, Ltd. (Aircraft Section), Weybridge, Surrey. [9035

APPLICATIONS, with certain exceptions, are subject to the approval of the Ministry of Labour and National Service.

PILOTS

WEST AFRICAN AIRWAYS CORPORATION have vacancies for pilots to be appointed as junior captains and invite applications from pilots who hold a current Airline Transport Pilot's Licence. West African Airways Corporation have an expanding fleet of Marathon, Dove and Wayfarer aircraft.

SALARY according to qualifications and experience within the range of £1,000 per annum and £1,900 per annum.

FREE fully furnished accommodation is provided in West Africa, but married men on initial engagement may be required to serve for a few months before being joined by their families.

FREE return passages are provided each tour for the employee, his wife and up to two children, not exceeding 18 years of age.

TOURS of duty will be from 12 to 15 months with leave on full salary at the rate of one-fifth of the period of service in West Africa.

CONDITIONS of service will include membership of a pension scheme allowing retirement at 45, subject to a minimum of 10 years service. (Retirement five years earlier may be arranged by mutual agreement.) In the case of employees not completing 10 years' service, a gratuity arrangement exists whereby, subject to a minimum of four years' service, a payment at the rate of £150 for each full year of service will be made on termination of appointment.

A COMPREHENSIVE contributory medical scheme exists for employees and their families.

APPLICATIONS should be submitted to the local Agents of W.A.A.C., B.O.A.C., Airways House (Room 106), Great West Road, Brentford, Middlesex. [0740

RADIO OFFICERS.

WEST AFRICAN AIRWAYS CORPORATION have vacancies for radio officers. Essential qualifications include possession of current M.C.A. 1st class flight radio telegraphy operator's licence.

SALARY according to qualifications and experience within the range of £1,100 per annum to £1,900 per annum (all-in).

IN lieu of benefits from a pension scheme, radio officers receive a bonus of £37.10. for each completed three months of service.

FREE fully furnished accommodation is provided in West Africa, but married men on initial engagement may be required to serve for a few months before being joined by their families.

FREE return passages are provided each tour for the employee, his wife, and up to two children, not exceeding 18 years of age.

TOURS of duty will be from 12 to 15 months with leave on full salary at the rate of one-fifth of the period of service in West Africa.

APPLICATIONS should be submitted to the Local Agents of W.A.A.C., British Overseas Airways Corporation, Airways House (Room 106), Great West Road, Brentford, Middlesex. [0741

SILVER CITY AIRWAYS, LTD.

VACANCY exists in fully approved workshop for "A" and/or "B" licensed radio engineer.—Applications for interview, all expenses will be paid, to Manager, Blackbushe Airport, Camberley. [9089

SILVER CITY AIRWAYS, LTD.

APPLICATIONS are invited from experienced "A" and/or "B" licensed engineers for ground and flying duties, preferably, but not essentially, endorsed for Bristol 170, Hercules engines.—Write for interview, all expenses will be paid, to Manager, Blackbushe Airport, Camberley. [9090

SENIOR airframe design draughtsman required for structural work on new aircraft.—Applications, in writing to Chief Designer, Auster Aircraft, Ltd., Rearsby, Leicester, or to local Labour Exchange. [9088

SKYWAYS, Ltd. are extending their York fleet and require additional navigating and second officers with appropriate M.C.A. licences.—Applications to the Personnel Manager, 6-7, Berkeley Street, London, W.1. [0280

AIRCRAFT engineer required for service in Rangoon, A.A. and C. licence required on D.H. Dove aircraft. Good salary and allowances. Free accommodation, messing and passage.—Box 6124. [9014

LICENSED radio engineer and radio mechanics at our base at Stansted Airport, Essex. Apply by letter or telephone to the Senior Radio Engineer, Aviation Traders, Ltd., Southend Airport, Essex. Tel.: Rochford 50491. [9050

LADY or gentleman, aged 21-45, with intimate knowledge of civil aviation, wanted for instructional and organising duties in London. Lecturing experience essential. Substantial annual bonus scheme.—Write, stating minimum salary, Box 6130. [9030

SENIOR and intermediate design draughtsmen with good experience of aircraft or light structural or mechanical engineering, required for aircraft and armament project work. Apply by letter to Portsmouth Aviation Ltd., The Airport, Portsmouth. [9078

TECHNICAL illustrator required, aged 23 or over, with considerable practical experience.—Applications in writing to Personnel Manager, Percival Aircraft, Ltd., Luton Airport, Beds., stating age, experience and salary required. [0500

AIRCRAFT or mechanical draughtsmen required, all grades. Apply, stating age, experience and salary required, to The Chief Draughtsman, Alan Munts and Co., Ltd., Aircraft Division, Langley Aerodrome, Slough, Bucks. [9060

TRE DE HAVILLAND AIRCRAFT Co., Ltd., Christchurch, Hants, require ratefixers (erection, fitting, and machining), jig and tool draughtsmen.—Please apply stating age, and experience to the Personnel Manager. [9020

GLOSTER AIRCRAFT Co., Ltd., have vacancies for aircraft design draughtsmen and electrical draughtsmen.—Write, giving full details of previous experience and salary required, to Employment Officer, G.A.C., Ltd., Hucclecote, Glos. [0010

JIG and tool draughtsmen, fully experienced, required by Percival Aircraft, Ltd., Luton Airport, Beds. Good working conditions and full welfare facilities, including staff pension scheme.—Applications to the Personnel Manager, stating age, experience, salary required. [0030

WESTLAND AIRCRAFT, Ltd., Yeovil, Somerset, require stressmen, junior and intermediate draughtsmen and technical writer.—Applications, stating age, experience and salary required, should be addressed to the Personnel Officer. [9095

SENIOR spares schedule clerk, capable of taking charge of compilation section, required by Percival Aircraft, Ltd., Luton Airport, Beds. Good welfare facilities, including staff pension scheme.—Applications, in writing, to Personnel Manager, stating age, experience and salary required. [0097

D. NAPIER AND SON, Luton Airport, Beds., have vacancies for experienced aerodynamicists for interesting programme of work in the sub-sonic and super-sonic fields. Please reply giving full particulars of past experience together with age and salary required to Personnel Manager. [9040

WOLVERHAMPTON AVIATION, Ltd., have vacancies for A. and C. licenced aircraft engineers at Wolverhampton. Canteen facilities and limited single lodging accommodation available.—Applications, giving full particulars, to Wolverhampton Aviation, Ltd., Municipal Airport, Wolverhampton. [9031

H. M. HOBSON, Ltd., invite applications for positions in the drawing office as follows: designers, detail and modification draughtsmen, checkers, stressmen. The work is concerned with interesting projects connected with fuel metering equipment and hydraulic flying controls for aircraft.—Hobson Works, Fordhouses, Wolverhampton. [0420

APPLICATIONS are invited from senior and intermediate design draughtsmen. Experience of aero-engine design desirable, but not essential. Also checkers. —Please write, stating age and giving details of previous experience in chronological order, to the Personnel Officer, The de Havilland Engine Co. Ltd., Stag Lane, Edgware, Middlesex. [0930

DOWTY EQUIPMENT LIMITED

require first class sound

PRACTICAL ENGINEERS

preferably with some experience of design, development and testing of jet engine accessories, particularly flow, acceleration and speed governing controls, burners and pumps. Exceptional prospects of advancement.

SENIOR DRAUGHTSMEN

required for development work on fuel systems. Experience on light hydraulic or pneumatic controls acceptable.

SENIOR DRAUGHTSMEN

for hydraulic and undercarriage department also required.

JIG & TOOL DRAUGHTSMEN, STRESSMEN AND TECHNICAL WRITER

Important positions with prospects.

The Company's conditions are exceptionally good. There is a realistic pension scheme and the environment is ideal.

The Company employs a Housing Officer who will render every assistance.

Write, preferably in tabulated form to
PERSONNEL MANAGER,
DOWTY EQUIPMENT LTD.
CHELTENHAM

FLYING TRAINING
TO
HIGHEST MODERN STANDARDS
FOR
Private and Commercial Pilots' Licences Instructors' Rating

TIGER MOTH & AUSTER £3 per hour
NIGHT FLYING - - - £4 per hour

Contract Rates on Application
Ministry of Civil Aviation Approval

MARSHALL FLYING SERVICES LTD.
THE AERODROME, CAMBRIDGE
Tel. CAMBRIDGE 56291

ENGLISH ELECTRIC have vacancies for aircraft draughtsmen at Warton Aerodrome, near Blackpool. Men with good aircraft drawing office experience are invited to apply for these interesting positions which carry good salaries.—Write, giving full details, quoting reference 12/95, to Central Personnel Services, the English Electric Co., Ltd., 338/7 Strand, London, W.C.2. [9040

JIG and tool inspector required for a factory in Hertfordshire for work on power press tool assembly fixtures for sheet metal structures. Sound knowledge of workshop, geometry and trigonometry and good general engineering experience essential.—Write, Box No. A.C. 77896, Samson Clarks, 57-61 Mortimer Street, London, W.1. [0027

STRESSMEN and loftsmen are required by the Aircraft Division of the English Electric Co., Warton Aerodrome, near Blackpool. Applicants should have a degree or H.N.C. and previous experience of this type of work. Please reply quoting ref. 93F to Central Personnel Services, English Electric Co., Ltd., 338/7, Strand, London, W.C.2. [9039

TEST laboratory assistants (male) required by Percival Aircraft, Ltd., Luton Airport, Beds. National Certificate standard and previous experience on design of test laboratory equipment desirable. Good welfare facilities including staff pension scheme.—Applications, stating qualifications, experience, age and salary required, to Personnel Manager. [0595

METHODS engineers, planners and jig and tool draughtsmen required for super-priority aircraft work. Superannuation scheme; excellent canteen and sports facilities. Key workers can be recommended for houses after satisfactory probation.—Write, giving full particulars, to Personnel Department, Vickers-Armstrongs, Ltd., South Marston, Nr. Swindon, Wilts. [9032

REQUIRED immediately by Percival Aircraft, Ltd., Luton Airport, Beds, several draughtsmen with comprehensive experience of engine installations and allied systems. Good welfare facilities, including staff pension scheme.—Applications, in writing, stating age, qualifications, experience and salary required, to the Personnel Manager. [0601

APPLICATIONS are invited from design draughtsmen and stressmen, also technical assistants with combined design and performance experience for work on both reciprocating and gas turbine aero-engines.—Applications should state full particulars of experience and qualifications and should be addressed to the Personnel Officer, The de Havilland Engine Co., Ltd., Stag Lane, Edgware, Middlesex. [0932

AIR FORCE, Naval, civil and helicopter aircraft all under design and development at Percival Aircraft, Ltd., Luton Airport, Beds. Applications are invited from senior and junior draughtsmen and stressmen, for work on this interesting programme. Good welfare facilities, including staff pension scheme.—Write, giving details of experience and salary required, to Personnel Manager. [0595

DEVELOPMENT engineers, designers, draughtsmen and modification draughtsmen, technicians, technical writers, technical illustrators, technical assistants and stressmen required for aircraft pressurizing, high altitude breathing, etc.—Fully detailed applications with salary required to Personnel Officer, Normalair, Ltd., Yeovil, Somerset. Local interviews arranged where convenient. [8964

THE DE HAVILLAND AIRCRAFT Co. invites applications for a post in the Structural Test House. Applicants must have had experience of testing airframe components and reporting on same, and under supervision be capable of designing and stressing test rigs.—Apply, stating age, experience and salary required, to Chief Structural Engineer (Aircraft), The de Havilland Aircraft Co., Ltd., Hatfield Aerodrome, Herts. [8903

STRUCTURAL test engineer, required by the English Electric Co., Ltd., Luton, to design test rigs and supervise tests on their guided weapon project. Candidates should have a degree or H.N.C. in engineering and preferably previous experience of structural test work. Knowledge of aircraft or light alloy structures an advantage, but not essential. Commencing salary according to qualifications and experience.—Please reply, quoting reference 1042A, to Central Personnel Services, The English Electric Co., Ltd., 338-7 Strand, London, W.C.2. [9004

BRITISH EUROPEAN AIRWAYS invite applications for the post of deputy chief maintenance engineer. Principal qualifications required are wide and extensive experience in modern methods of works management and administration; an engineering degree is desirable. Commencing salary will be not less than £1,500 p.a. The successful applicant will be required to pass a medical examination and participate in pension scheme.—Applications, giving full details of age, qualifications and experience, to Chief Personnel Officer, B.E.A., Keyline House, Ruislip, Middlesex. Closing date December 22nd, 1952. [0033

MINISTRY OF SUPPLY require engineer at Farnborough, Hants, to control maintenance and survey of aircraft, including fitting of experimental installations, for liaison with Service flying personnel and with authorities progressing manufacture of equipment. Qualifications: British, of British parentage; recognised engineering apprenticeship, corp. membership of Inst. of Civil, Mech., or Elec. Engineers or A.F.R.Ae.S., or exempting qualifications. Experience in control of industrial staff, knowledge of trade union requirements and practical knowledge of aircraft servicing. Salary within £1,256 to £1,454 p.a. Not established, but opportunities occur periodically for established pensionable posts.—Application forms from M.O.L.N.S., Technical Scientific Register, Almack House, 26, King Street, London, S.W.1, quoting Ref. No. C.720/52A. Closing date, January 2nd, 1953. [9043

BOOKS, ETC.

SELLING several hundred aeronautical books. Write stating particular interests.—Box 4236. [9037

SALE. *Flights*, 1940-1959. Offers.—Fantham, 10, Classbrook Terrace, Penrhiwceiber, Glam. [9042

"ARCHITECTURE as a Career: A Practical Handbook for Students," by Maurice E. Taylor, M.T.P.I., A.R.I.B.A., F.I.L.A., F.R.I.A.S., F.S.A.Scot., R.I.B.A. Dist.T.P., A.A.Dip. of Planning. Discusses the various methods of approach to the architectural profession, gives information about the various R.I.B.A. exams, and offers much useful information to the intending architect on every aspect of planning his career. 10/6 net from all booksellers. 10/11 by post from Iliffe & Sons, Ltd., Dorset House, Stamford St., London, S.E.1.

"MATERIAL Handling in Works Stores," by L. J. Hoefkens. Shows how the use of fork-lift trucks and pallets in industrial stores can increase production, utilize floor space more effectively, help control of movement and reduce costs. Includes a description of a system actually operated in a modern factory. 10s. 6d. net from all booksellers. By post 10s. 11d. from Iliffe & Sons, Ltd., Dorset House, Stamford St., London, S.E.1.

Have you got the right connections?

Even the best-designed fuel-run can hold up refuelling operations if the method of connecting one pipe to another causes restrictions. The F. R. Pipe Connector, although designed specifically for pressure-refuelling systems, has proved itself the ideal connector for use in fuel systems generally.

★ Note the following advantages of the

F.R. PIPE CONNECTOR

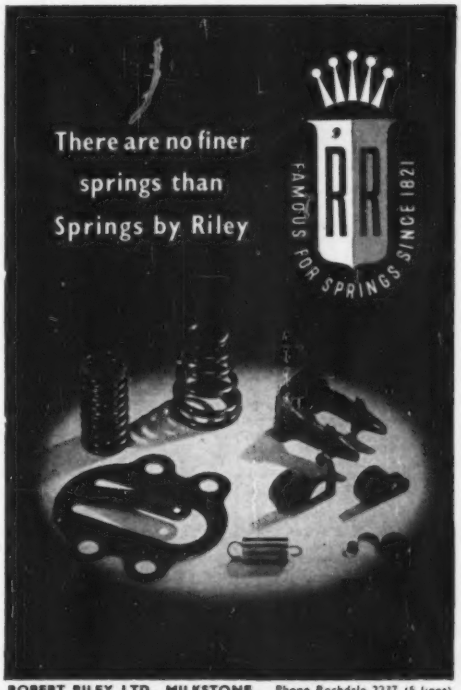
- A degree of flexibility both axially and radially.
- No captive fittings.
- Low weight and compactness.
- No special pipe end fittings.
- No restrictions to flow.
- Wide temperature range (70° to —79°C).
- Easy connections in confined spaces.
- Large range of sizes from ¼" to 4"

FR
Pressure refuelling equipment
FLIGHT REFUELLING LTD
ENGLAND

If you are having trouble with your connections, write to us

FLIGHT REFUELLING LIMITED

Tarrant Rushton Airfield · Blandford · England. Tel.: Blandford 501



ROBERT RILEY LTD., MILKSTONE SPRING WORKS, ROCHDALE
Phone Rochdale 2237 (5 lines)
Grams "Rilospring" Rochdale

I.C. ENGINE DESIGNERS
URGENTLY REQUIRED

GOOD PROSPECTS FOR THE RIGHT TYPE OF APPLICANT

SALARY ACCORDING TO AGE, QUALIFICATIONS AND EXPERIENCE

APPLY IMMEDIATELY TO:

PERSONNEL MANAGER
ROLLS-ROYCE LTD.
PYM'S LANE · CREWE

SLINGSBY SAILPLANES LTD.
CONTRACTORS TO H.M. GOVERNMENT
DESIGNERS AND MANUFACTURERS
OF
THE FAMOUS **"SKY"** SAILPLANE

The leading competition machine with performance and handling characteristics superior to any other sailplane in production

AN ALL-BRITISH PRODUCT

SLINGSBY KIRBYMOORSIDE YORK
"PIONEERS OF BRITISH GLIDING"

THE
Bristol
AEROPLANE COMPANY LIMITED
have

VACANCIES
in their Wind Tunnel Department for

INTERMEDIATE TECHNICAL ASSISTANTS

for carrying out tests and interpreting results. Applicants should be of degree standard or hold the Higher National Certificate in aircraft engineering, preferably with previous industrial experience.

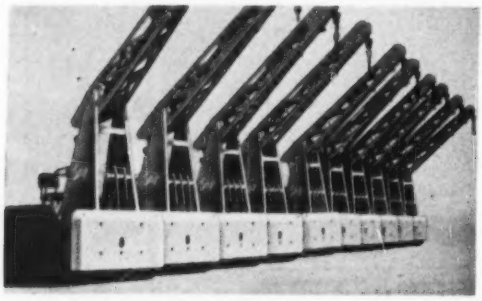
The Company has a wide range of designs in progress, including large civil aircraft, helicopters and advanced military projects. Salaries, working conditions and prospects of promotion on merit are excellent. Facilities for subsidized private flying are provided at Filton.

Applications should be addressed to the Personnel Manager, Bristol Aeroplane Company Limited, Aircraft Division, Filton House, Bristol.

INTRODUCING A THOROUGHBRED—

the NEW 'Staffa' MOBILE CRANE

Capacity 2 to 3 tons



The new 'Staffa' 2 3 ton Mobile Crane has been specially designed to give industry the right crane for many different jobs. It is robust, extremely manoeuvrable and simple to operate with special hydraulic luffing for smooth action finger-tip control. The forward mounted jib is fixed in line with the chassis and counterweight, thus giving maximum stability under any variations of load and ground conditions. It is British made throughout on the unit principle for easy replacement of components.

★ *Power Unit Newage/Austin o.h.v., 1200 c.c. petrol engine.*

★ *Gears Synchromesh, 4 forward and 1 reverse.*

★ *Manoeuvrability: can be turned within own length.*

★ *Controls, standard car type.*

For use in General Engineering, Shipbuilding, Railway Transport, and Factory Handling.

Further details and illustrated brochure from

CHAMBERLAIN INDUSTRIES LTD

Staffa Works, Staffa Road, Leyton, London, E.10 England
LEYtonstone 3678

Staffa

THE

Bristol

AEROPLANE COMPANY LIMITED

have

VACANCIES

in their Aircraft Design Drawing Offices in Filton and London for:—

SENIOR AND INTERMEDIATE DRAUGHTSMEN

preferably with experience on aircraft or light mechanical design.

The Company has a wide range of designs in progress, including large civil aircraft, helicopters and advanced new military projects. Salaries, working conditions and prospects of promotion on merit are excellent. Facilities for subsidized private flying are provided at Filton.

Applications should be addressed to the Personnel Manager, Bristol Aeroplane Company Limited, Aircraft Division, Filton House, Bristol.

The
British Air Line Pilots' Association
95 MOUNT STREET, W.1
Tel.: GROsvenor 6261

Membership open to all Commercial and Service pilots. For full details as to the objects and particulars of Membership please write to Secretary.

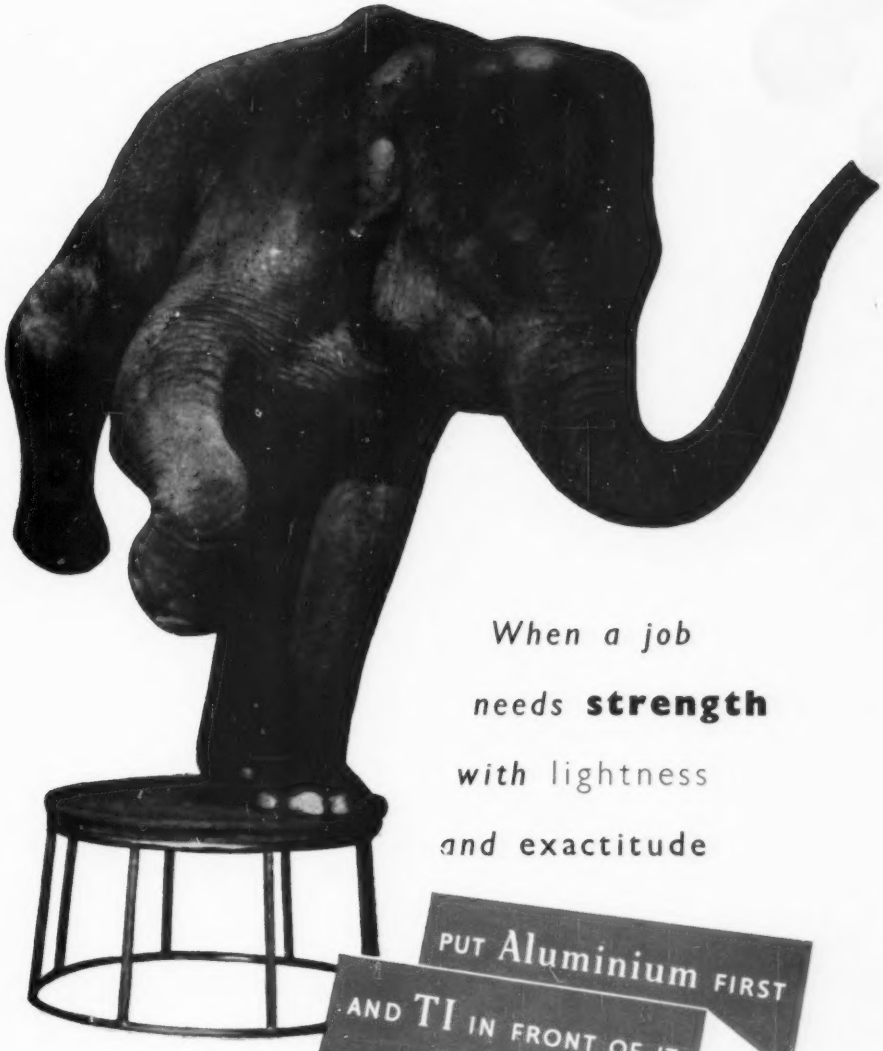
R.A.F. OFFICERS
UNIFORMS
NEW AND RECONDITIONED
LARGE SELECTION IN STOCK
FISHERS, 86/88 WELLINGTON ST., WOOLWICH, S.E.18 'PHONE 1055

JABROC
SAVES STEEL
For **PRESS TOOLS, JIGS & TEMPLATES**
(PROMPT DELIVERY)
TOOLS DESIGNED AND MADE BY US TO YOUR SPECIFICATION
MOULDED COMPONENTS (JABLO) LTD.
Jablo Works, Waddon, Croydon, Surrey
'Phone: CROydon 2201. Grams: JABLO CROYDON

INDEX TO ADVERTISERS

	Page
Aerocontacts, Ltd.	32
Armstrong Whitworth Aircraft, Ltd., Sir W. G.	Cover ii
Aviation Traders, Ltd.	24
Boulton Paul Aircraft, Ltd.	5
Bristol Aeroplane Co., Ltd., The	27, 28, 35, 36, Cover iv
British Air Line Pilots' Association, The	36
British European Airways	21
Bryans Aeroquipment, Ltd.	27
Chamberlain Industries, Ltd.	36
Coley Metals, Ltd.	28
Cowper Penfold and Co., Ltd.	1
Cross Manufacturing (1938), Ltd.	31
De Havilland Aircraft Co., Ltd., The	16, 33
Desoutter Bros., Ltd.	20
Dowty Equipment, Ltd.	34
E.M.I. Institutes	30
Fairey Aviation Co., Ltd., The	10
Field Aircraft Services, Ltd.	33
Firth-Vickers Stainless Steels, Ltd.	7
Fishers	36
Flight Refuelling Ltd.	35
General Electric Co., Ltd., The	28
Goodyear Tyre and Rubber Co. (Great Britain) Ltd., The	14
Graviner Manufacturing Co., Ltd., The	29
Guest, Keen and Nettlefolds (Midlands), Ltd.	26
Habershon and Sons, Ltd., J. J.	22
Handley Page, Ltd.	18
Lewis, Ltd., D.	31
Lucas (Gas Turbine Equipment), Ltd., Joseph	11
Marshall Flying Services, Ltd.	34
Martin-Baker Aircraft, Ltd.	17
Meerloo and Sons, Ltd., John	30
Modern Furnaces and Stoves, Ltd.	30
Mond Nickel Co., Ltd., The	23
Moulded Components (Jablo), Ltd.	36
Napier and Sons, Ltd., D.	13
National Institute of Engineering	33
Percival Aircraft, Ltd.	15
Peto and Radford, Ltd.	2
Pioneer Parachute Co., Inc.	8
Redifon, Ltd.	9
R.F.D. Co., Ltd.	6
Riley Ltd., Robert	35
Roe and Co., Ltd., A. V.	31
Rollason, Ltd., W. A.	31
Rolls-Royce, Ltd.	19, 35
Rumbold and Co., Ltd., L. A.	30
Saunders Valve Co., Ltd.	29
Self-Priming Pump and Engineering Co., Ltd.	4
Short Bros. and Harland, Ltd.	12
Slingsby Sailplanes, Ltd.	35
Teddington Controls, Ltd.	26
T.I. Aluminium, Ltd.	Cover iii
Vickers-Armstrongs, Ltd.	3, 30
Wakefield and Co., Ltd., C. C.	25
Westland Aircraft, Ltd.	Cover i
Wynstruments, Ltd.	23

Printed in Great Britain for the Publishers, ILIFFE & SONS LTD., Dorset House, Stamford Street, London, S.E.1, by SUN PRINTERS LTD., London, and Watford, Herts. *Flight* can be obtained abroad from the following: AUSTRALIA AND NEW ZEALAND: Gordon & Gotch, Ltd. INDIA: A. H. Wheeler & Co. CANADA: The Wm. Dawson Subscription Service, Ltd.: Gordon & Gotch, Ltd. SOUTH AFRICA: Central News Agency, Ltd.; Wm. Dawson & Sons (S.A.), Ltd. UNITED STATES: The International News Co. Entered as Second Class Matter at the New York, U.S.A., Post Office.



When a job

needs **strength**

with lightness

and exactitude

PUT Aluminium FIRST

AND TI IN FRONT OF IT

T.I. ALUMINIUM LTD · REDFERN ROAD · TYSELEY · BIRMINGHAM · A COMPANY

THE "BRISTOL" *Britannia*

The BRITANNIA offers a payload-range performance of entirely new breadth. The full volumetric payload of 25,000 lb. may be carried over a range of 4,000 miles; maximum range is 5,550 miles, yet for ranges as short as 500 miles the direct operating costs are low enough to be competitive with the smaller airliners. At the same time the aerodynamic quality of the aircraft enables all this to be done at block-speeds a good deal higher than the present standards.

"Bristol"

THE BRISTOL AEROPLANE COMPANY LIMITED · ENGLAND

172A